COMPENSATING BIODIVERSITY LOSS

The 'BioCom' Project

Dutch companies' experience with biodiversity compensation, including their supply chains

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PREFACE

Compensation for damage to biodiversity is a relatively new topic in the business environment. Most private sector companies dealing with compensation do so because of a legal obligation. Companies are increasingly becoming aware, though, that our welfare and well-being depend on healthy ecosystems and biodiversity. Also, from a Corporate Social Responsibility (CSR) point of view, companies start to realize that securing continued access to natural resources is a key factor to their profitability.
This inspires more and more companies to take up the challenge to start a project aiming to voluntarily compensate for biodiversity loss or damage.

The Biodiversity Compensation (BioCom) project has been a voluntary, collaborative project of three private sector companies, two NGOs and two departments of the Dutch Government, with the objective to prepare practical, doable compensation plans for (part of) the business activities of the three participating companies, and to seek for the development of guidance for businesses. Only one of the resulting compensation plans has been accepted by the management of that company and is now in an advanced stage of implementation. The implementation of the other plans has mainly suffered from the economic crisis: companies try to survive and financial means could not be made available for what is considered as extra costs at this stage. However, the focus on mitigation measures to reduce biodiversity impacts was in any way given a renewed impulse through the project.

The BioCom project started in March 2008 and was finalized in February 2009. After the close-out of the project, we concluded that this project has produced such valuable information and knowledge that it is worth sharing it with other interested companies and organizations. Against this background we decided to produce this report.

Acknowledgements
We like to thank all those that contributed to the BioCom project and this publication, in particular Mark van Oorschot en Michel Bakkenes (Netherlands Environmental Assessment Agency), Henk Simons (IUCN NL), Willy Douma (HIVOS), Pieter van Eijk (Wetlands International), Nanda Gilden (Alcedo Consultancy BV), Stefan van der Esch and Arthur Eijs (Ministry of Infrastructure and the Environment), and Martin Lok (Ministry of Economic Affairs, Agriculture and Innovation). We are most grateful to Kruidenier Groep BV (Christy Kool), Koninklijke Houthandel G. Wijma & Zonen BV (Mark Diepstraten), and BioX Group BV (Arjen Brinkmann) for their participation in BioCom and their approval to incorporate summaries of their compensation plans in this publication. We acknowledge the financial contribution by the Dutch Ministry of Housing, Spatial Planning and the Environment (today: Ministry of Infrastructure and the Environment) that made it possible to execute BioCom.

This report is entirely the responsibility of the authors. Especially parts V and VI are the reflection of our discussions after the project had ended.

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WAGENINGEN UR
For quality of life

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CREM WORKING ON SUSTAINABILITY

EXECUTIVE SUMMARY

Introduction

The importance of biodiversity, the global diversity of ecosystems, species and genes, is generally accepted, especially because biodiversity plays a key role in providing ecosystem services that are vital to our welfare and well-being. In view of the ongoing global decline in biodiversity, different initiatives are searching for ways to conserve and strengthen existing biodiversity. One of the options is biodiversity compensation. Within the Biodiversity Compensation project (BioCom), we defined biodiversity compensation as: *"A set of actions that lead to measurable conservation outcomes, designed to compensate for residual biodiversity impacts that arise from the activities of an existing or new project and that remain after appropriate prevention and mitigation measures have been implemented".*

The ultimate goal of biodiversity compensation is to ensure a 'no net loss' of biodiversity or preferably a 'net gain' of biodiversity.

Only a limited number of countries have regulation for biodiversity compensation and this is generally limited to specific ecosystems and habitats, defined areas and selected species. Also, there are very few (if any) examples of private sector companies that have

(1) assessed all of their economic activities, including activities from business partners up and down the supply chain;
(2) identified the (potential) negative impacts on biodiversity as a result of these activities; and
(3) analyzed how biodiversity consequences occurring could be compensated for. This lack of information and guidance was the motive to develop BioCom: to prepare biodiversity compensation plans for supply chains, and develop guidance for businesses.

The BioCom project piloted the above approach with the aim to:

- prepare concrete and practical compensation plans for (a part of) the business activities of a limited number of Dutch private sector companies that have both a direct impact on biodiversity through their actual footprint as well as an indirect impact through their supply chain partners;
- explore a design for no net biodiversity loss in supply chains;
- obtain insights in the unknown potentials for business advantages, practical objections and pitfalls, knowledge gaps, as well as the guidance / support / facilitation potential of governmental bodies and NGOs in the field of voluntary biodiversity compensation.

Approach and process

BioCom adopted the approach of jointly working with private sector companies, NGOs and government towards compensation plans, fit-for-purpose for the participating companies, acceptable for society and, if possible, feeding into developing legislation and policy in the Netherlands. In BioCom the Dutch government, two NGOs (HIVOS, Wetlands International) and three companies - BioX Group BV (energy), Kruidenier Groep BV (foodservices), and Koninklijke Houthandel G. Wijma & Zonen BV (timber) - worked together to prepare such biodiversity compensation plans for the companies involved. They were supported by contributions of the Netherlands Environmental Assessment Agency and IUCN National Committee of the Netherlands NL.

Given that supply chain compensation was unchartered territory, the project adopted a learning-by-doing strategy. The project demanded a setting and approach that would create trust, inspiration, out-of-the-box thinking and collaboration. The 'Focused-Result-Delivery' (FRD) method was selected as the one best suited for project delivery. It was, however, impossible for the majority of participants to completely free themselves from other work and commitments for a short, uninterrupted period. Therefore, we adjusted the approach without giving up the essential elements of the FRD approach: (efficiency, multi-disciplinary input, alignment and dialogue, creativity and knowledge-base). A few multi-days' meetings were scheduled over a period of 11 months that enabled companies to gather their data, participants to settle agendas for spending time on the project and knowledge institutions to study and work on the footprint measurements. This format also enabled the project to organize two feedback sessions with external experts and stakeholders (so-called Fish Bowls).

Achieving agreement on definitions, principles and conditions to be applied was considered to be the essential first step in the process of ensuring a shared basis. This publication gives an overview of the shared:

- definitions: biodiversity, compensation, historical loss, and indirect effects;
- principles: supply chain responsibility and boundary setting, biodiversity-business interface; methodologies to determine the biodiversity footprint; currency; like-for-like; correction factor, and additionality;
- conditions: pre-compensation, compensation plan, execution of compensation plans, long term assurances, and stakeholder participation.

Biodiversity compensation plans

Summaries of the three company compensation plans that were finalized in February 2009, have been incorporated in this publication. The three summaries clearly show that there is no such thing yet as one process, one kind of plan or one kind of methodology that prescribes the most suitable format for a compensation plan. At the same time BioCom has been a pioneering project and experience gained does not allow the making of general statements on how supply chain compensation should be carried out.

It did become evident that supply chain compensation demands huge efforts from companies since there are so many different biodiversity pressures of different dimensions, either current and/or historical, and the fact that there are many different stakeholders. Data in one supply chain may be much more accessible than in another chain and so there will be a difference in the willingness of supply chain partners to cooperate. All these aspects decide the set-up, extent and level of detail of the compensation plans.

A final conclusion is that – generally speaking – choices have to be made with respect to the extent of compensation: compensating for all residual negative impacts on biodiversity throughout the supply chain, including historical losses, will often not be attainable for one company from a financial point of view. Hence, a risk-based approach should be adopted.

Lessons learned

In order to move companies forward in the field of voluntary (supply chain) compensation, experience with biodiversity compensation of existing (supply chain) activities should be shared! A significant part of this publication is dedicated to the sharing of lessons learned in BioCom. They can be used to facilitate and support a next biodiversity compensation project, other supply chain initiatives or perhaps even legislation. All lessons learned have been categorized in one of the following groups:

- Policy and principles
- Assessment
- Implementation
- Management and Reporting

Each 'lesson' starts with a short explanation of its contents, followed by the relevance of the theme for biodiversity compensation, and the BioCom experiences. When relevant and appropriate, the approach chosen and/or any dilemmas run into have been explained.

A tremendous amount of experience has been gained in dealing with supply chain biodiversity compensation, the dilemmas and challenges companies run into, and the variety in supply chains of the participating companies. Four major conclusions which can be drawn from the lessons learned are:

1. Existing activities versus new developments was an innovative element of BioCom. The majority of biodiversity compensation examples deal with new developments e.g. a company starting economic activities in an area with significant biodiversity values. BioCom experienced that important biodiversity gains can be achieved when all drivers for biodiversity loss are being analyzed and compensated for, especially when historical loss is taken into account. The assessing and compensating of biodiversity that was once there, was a whole new challenge to conquer. The issue of historical loss ("How to calculate and deal with historical loss?") was the most debated one during BioCom.
2. Similarities and overlaps exist between biodiversity compensation efforts focusing on supply chain activities and biodiversity compensation for a company own's activities. The gaps ask for different tools, approaches and solutions. For example, supply chains generally generate a larger variety of impacts due to the different production and processing levels involved. Not all impacts could be taken into account and a focus on the larger, major impacts (risk-based approach) was necessary.
3. Supply chain compensation is a new chapter in the (short) history of biodiversity offsetting. BioCom is a good start, though far from sufficient for companies to draw rigid conclusions or unambiguous guidance.
4. It is clear that investing in more efforts into supply chain compensation will help upscaling, making it a valuable tool to motivate and/or press companies in conserving and sustainably using biodiversity and taking responsibilities. However, the BioCom approach, solutions and lessons learned which are shared throughout this publication already offer a potential for frontrunners in biodiversity compensation to build upon.

Further development of supply chain compensation guidance can be supported by taking certain steps and investments, for example, the development of tools, undertaking of research or execution of additional pilots. Based on the lessons learned and conclusions drawn, recommendations have been formulated for research, companies, NGOs and governments.

Key recommendations are:

Research

- To assess the extent to which existing tools and methodologies can be aligned with the demands from (supply chain) compensation. The results should be used to (1) enhance or adjust existing tools and methodologies where possible and desirable; (2) draw up a research agenda for necessary new tools and methodologies with an assessment of input needed (time, funds, tools).
- To research new compensation tools and methodologies (based on the research agenda), where needed to allow a wider use and better output of the compensation concept. It is recommended to link up with existing developments, such as REDD+, a CO_2 compensation schedule potentially also benefiting biodiversity.
- To develop comprehensive guidance that presents a consistent approach on biodiversity compensation issues.

Companies

- To anticipate an environment in which clients, legislation, investors, etc. will start demanding attention for (potential) negative impacts on biodiversity caused by business activities, and biodiversity compensation.
- To map stakeholders in the area the company is active in and seek contact with NGOs and authorities to discuss biodiversity risks and opportunities in this field.
- To gather biodiversity pressure information throughout the supply chain as part of the company's ongoing environmental management system and try to minimize negative impacts (e.g. through the purchase of products/commodities with a sustainability trademark).
- To engage stakeholders in the process and activities in the field of biodiversity compensation, and disclose information, not only on potential benefits but also on risks and potential adverse impacts resulting from compensation plans.
- To work together with governments, NGOs and research institutions in pilot projects with a focus on supply chain compensation.

NGOs

- To become familiar with business processes and management systems in order to understand where best efforts can be made in helping companies reduce their environmental/biodiversity footprint.
- To use contacts, knowledge, support in society and the ability to start (inter)national discussions to create pioneering work in the field of biodiversity compensation.

Governments

- To be a driving force to motivate and engage other actors moving the topic of biodiversity (supply chain) compensation forward by initiating projects, support frontrunners in different business sectors, stimulate research, develop laws and/or use contacts with other governments to join forces. For example, national/regional development plans could recognize that compensation areas are dedicated to nature conservation and sustainable resource use. Also, governments could motivate companies to link up their compensation plans with national biodiversity objectives and thus gain support on governmental level. Moreover, government is a party to and/or organizer of many initiatives in society, ranging from international business supporting trips, subsidy funds and economic action plans to foreign development aid. Biodiversity compensation will make a large step forward when it receives attention, where logical, applicable and possible, in such existing initiatives.

The (No Net Loss Initiative, as part of the) Dutch Biodiversity Taskforce, could take a leading role in coordination and standardization of biodiversity (supply chain) compensation in order to get to fit-for-purpose guidance and the conservation outcomes aimed for.

COMPENSATING BIODIVERSITY LOSS

Guidance for biodiversity compensation by private sector companies

One of the main causes for the loss of biodiversity is in human activities: the way we produce, the resources we consume, etc. An increasing number of private sector companies feel a responsibility to minimize or even compensate for the loss of biodiversity they create. They often just do not know how.

Our case studies demonstrate that the rules of compensation cannot be fully designed neither can the structure be clearly defined beforehand. There is no 'one size fits all' approach as far as biodiversity compensation is concerned, since no two hectares are ecologically similar and the biodiversity footprint is hard to express into a single, generally accepted indicator.

Our experiences in BioCom made it possible to draw up guidance for the increasing number of people interested in this topic and to help companies moving forward towards the implementation of supply chain biodiversity compensation. The outline on the right and the steps elaborated in this publication offer a blueprint for developing and implementing biodiversity compensation plans. The dialogue with stakeholders is not presented as a separate step; it is an activity that is an ongoing process, from the start until the end of the preparation and implementation process, albeit at different levels of intensity depending on the process phase.

COMMUNICATION & STAKEHOLDER ENGAGEMENT

1 Ensuring in-company commitment
Ensuring in-house commitment and support for the development of the biodiversity compensation plan, and, once developed, for its implementation.

2 Describing company activities
Identifying key activities of the company and outlining the basic parts of the respective supply chains.

3 Selecting relevant company activities for compensation
Screening company activities to determine whether and how they pose a threat to biodiversity, with the aim to select company activities for compensation.

4 Assessing the pressures on biodiversity
Identifying the biodiversity pressures connected to the company's activities selected for compensation.

5 Undertaking a biodiversity baseline assessment
Gathering information on the pressures identified and (potential) consequences for biodiversity.

6 Stipulating the biodiversity footprint
Calculating the biodiversity footprint of the company's activities selected for compensation.

7 Taking prevention and/or mitigation measures
Applying prevention and/or mitigation measures to avoid or reduce the biodiversity footprint.

8 Establishing the residual impact on biodiversity
Calculating the net biodiversity footprint of the company's activities.

9 Selecting a biodiversity compensation option
Analyzing compensation options and selecting the most appropriate compensation efforts.

10 Preparing the biodiversity compensation plan
Drawing up a compensation plan to describe compensation efforts.

11 Implementation requirements
Identifying necessary activities, deliverables and timing for the implementation.

COMPENSATING BIODIVERSITY LOSS

TABLE OF CONTENT

COMPENSATING BIODIVERSITY LOSS

Part 1

Project overview

PART I- PROJECT OVERVIEW

This chapter starts with an introduction to the concepts of biodiversity and biodiversity compensation, and an overview of existing legislation and non-legislative initiatives in the field of biodiversity compensation. Moreover, information on the business case of voluntary biodiversity compensation is given. This chapter concludes by sharing the project objectives.

1.1 Introduction

When discussing biodiversity compensation, the first question of many companies will be: 'What is biodiversity?' Without actually realizing so, all companies – as is human life – are to a certain extent dependent on biodiversity. Biodiversity includes *the global diversity of ecosystems, species and genes*, ranging from deserts to tropical rainforests, from fish in the sea to micro-organisms in the soil, from genetic variety within livestock to that within agricultural crops. The significance of biodiversity is generally explained through its key role in the provision of ecosystem services. Examples of ecosystem services delivered are food, fresh water, wood and fibre, medicines, soil fertility, climate regulation, building materials, inspiration for scientific and technical development, genetic resources, flood regulation, and recreational facilities. The importance of the conservation of biodiversity for society was first widely recognized in 1992: a UN conference decided that the maintenance, sustainable use and sharing of access and benefits of biodiversity were to be laid down in an international convention; the Convention on Biological Diversity (CBD). Within the CBD the business community is increasingly considered as a valuable partner that can contribute to the achievement of the objectives defined. This is reflected in a growing number of decisions adopted by the Conference of the Parties of the CBD, which explicitly focus on the engagement of companies. At the same time, business and biodiversity initiatives are being unfolded at European Union level and through programmes adopted by the Dutch government.

Section 1.2 further elaborates on biodiversity and ecosystem services and their meaning to organizations and society as a whole.

There is no business organization that does not make use of one or more ecosystem services, both directly through their own activities as well as indirectly through supply chain partners. This explains why biodiversity is important to the present and future operations of all types of businesses, regardless of their size, sector or location. The unprecedented current rate of biodiversity loss throughout the world should therefore be a major concern to the business society[1] , and create a certain responsibility given the fact that economic activities have largely contributed to this loss.

In view of the ongoing global decline in biodiversity, different initiatives are searching for ways to conserve and strengthen existing biodiversity. Compensation for biodiversity loss is a frequently discussed subject in many different forums. The complexity increases when it comes to the impact of business activities on biodiversity and translating those impacts into compensation. This is partly due to a lack of knowledge and experience, partly because biodiversity is hard to quantify in a single generally accepted indicator (no

1 Global Biodiversity Outlook 3, Convention on Biological Diversity, 2010; http://gbo3.cbd.int/

COMPENSATING BIODIVERSITY LOSS

two hectares are the same), and partly because of the many interfaces between business activities and biodiversity.
Laws and regulations that include the compensation principle exist (see section 1.3) and new ones are under development, but adequate guidance is scarce on 'how' to compensate. This means that companies that see value in compensating for their biodiversity impact do not have much to build upon yet. The Business and Biodiversity Offset Programme (BBOP, see section 1.4) is working on the guidance for offsetting, but till recently it concentrated on compensation for direct land take in pilot projects – with a focus on infrastructure and extractive industries – that have not yet been concluded. BBOP does not yet take the impact of supply chains into consideration, while that is where most of the impacts originate and accumulate for companies not involved in the production of raw materials.

1.2 Defining biodiversity compensation

The term biodiversity was coined in 1986 and now it is a term of general usage, but the meaning of it has become rather blurred. Many people consider biodiversity being simply the variety of plant and animal species, either on a local, regional or a global level. For many scientists the term encompasses the overall variability of life on Earth and the natural patterns it forms, from microscopic blue-green algae to the tigers that roam the jungles of Asia.

The Convention on Biological Diversity defines biodiversity as:
"The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic systems and among the ecological complexes of which they are part, this includes diversity within species, between species and of ecosystems."

Hence, biodiversity is more than just the sum of plant and animal species on our planet, it comprises of:

- *Genetic diversity:* the variation of genes both within and between populations of plant and animal species;
- *Species diversity:* the variety of different plant and animal species within a given area; and
- *Ecosystem diversity:* the range of habitats, species populations and ecological processes that occur in an area.

Biodiversity is the underpinning feature of natural ecosystems (such as wetlands and tropical rainforests) and managed systems (e.g. plantations and farmland). The variability in biodiversity is essential for ecosystems to function efficiently. Ecosystems and the individual species encompassed within regulate numerous processes from which human society benefits, a concept known as ecosystem services. Ecosystem services can be classified in four groups:

- Many flooding disasters in our times can be attributed to the mismanagement of river catchment areas. Such area ecosystems, such as woodlands and wetlands, used to absorb excess precipitation to slowly release it again, in that buffering river water levels. This category of ecosystem services concerns *regulating services*.
- A next category includes services such as the storage and recycling of nutrients by wetlands, and pollination; the so-called *supporting services*.
- *Provision services* of ecosystems concern the delivery of products that are crucial to human wellbeing, e.g. food supply (fisheries, agricultural crops, etc.) but also medicines and timber.
- Ecosystems are a source of inspiration for art, and it plays an important role in religion, education and science. These services in the domain of the human mind are called *cultural services*.

Within the BioCom project[2], we defined biodiversity compensation as:
"A set of actions that lead to measurable conservation outcomes, designed to compensate for residual biodiversity impacts that arise from the activities of an existing or new project and that remain after appropriate prevention and mitigation measures have been implemented".

This definition has been based on the definition applied by the Business and Biodiversity Offset Program (see section 1.4). The application of the concept implies that in order to minimize the impacts, mitigation efforts are being applied prior to compensation activities. This is laid down in the so-called mitigation hierarchy that ensures that the concept is not used as a 'licence to destroy' (see sections 3.2 and 3.4.1 for more details).

The ultimate goal of biodiversity compensation is to ensure a 'no net loss' of biodiversity as a result of the economic activities undertaken, or preferably a 'net gain' of biodiversity in the sense of species composition, habitat structure, and ecosystem functioning and services, including the use by and cultural values for people. This goal has been translated in the definition of biodiversity compensation that we used in BioCom.

2 Referred to as 'BioCom' in the remainder of this document.

1.3 Compensation legislation and regulation

Biodiversity offsets, trading and banking are being used or developed in many countries. They were first formalized in the 1970s wetland mitigation in the United States of America. A non-exhaustive overview of relevant legislation and regulation is given in Annex 1. Three major observations are:

- There is a large variety in formats and application. In general: when company activities are subject to a law or regulatory framework involving a compensation scheme, a company will be bound to compensate for any arising residual impact on biodiversity due to its activities. However, policy goals for biodiversity compensation range from specific 'no net loss' and 'net gain' for species and habitats, to more general statements about the need to address adverse ecological impacts from development.
- Although compensation is aimed at counterbalancing unavoidable adverse environmental impacts to attain a net neutral outcome, Annex 1 shows that there is no consensus within different legislation and regulation frameworks on specific requirements on how to compensate. For instance the United States conservation banking, the EU Habitat Directive, and Brazilian compensation legislations do not directly address issues of no 'net loss' or 'net gain', i.e. they do not provide specific guidance on how much compensation would be sufficient to comply with the legislation. As an example: the EU Habitat Directive states – comparing intervention and compensation area – that the quality of an area should not deteriorate and offset has to take place in an area with similar a-biotic circumstances. Quantity is not a criterion in the Habitat Directive which implies that the compensation area does not have to be the exact equivalent of the intervention area in terms of number of species and size of the physical area. An overview of the wetland mitigation banking in the United States shows that usually more than one hectare of compensation is required for each hectare of habitat lost[3].
- Despite the lack of specificity most laws and regulations do maintain consensus on the fact that compensation can be exercised as an option for addressing environmental impacts only after efforts have been made to avoid or minimize impacts of any developmental activity.

3 Joshua Bishop, IUCN, presentation 18 November 2008: Biodiversity and compensation: legal and economic issues (http://www.epbrs.org/PDF/Bishop.pdf).

1.4 Existing biodiversity compensation initiatives

Only a limited number of countries have legislation and/or regulation for biodiversity compensation, and generally this is limited to specific ecosystems and habitats, defined areas and selected species (see Annex 1). Policies in this respect are absent in most countries and, therefore, there are no comprehensive regulations for compensating impacts as far as most of the world's ecosystems and genetic species are concerned.

The execution of regulatory and legislation-based required compensation is still in its infancy and a case-by-case approach is often applied. Initiatives are being unfolded to gain knowledge about the concept which gives compensation plans a project-specific interpretation. Especially among corporations operating in areas of high conservation value where regulatory frameworks are absent, voluntary compensation is being taken up. Companies sometimes use their own standard and verification system to draw up a system that specifically suits their needs and demands. Voluntary compensation can even become an integral part of a corporation's environmental management policy (see box 1.1).

Box 1.1: Biodiversity policy by Rio Tinto

Rio Tinto is one of the world's leading mining and exploration companies.

"Our strategy states that we aim to have a net positive impact (NPI) on biodiversity. We, therefore, need to demonstrate that our actions have positive effects that outweigh the inevitable negative effects of the physical disturbances and changes of land associated with mining. In 2006, our biodiversity programmes have been focused on two key issues that affect our ability to achieve goal: Being able to effectively measure and communicate our impacts on biodiversity and the performance of our management actions. […]
The opportunities for minimising negative effects and creating positive outcomes will vary greatly from one project or operating site to another. As a first step, our operations use mitigation measures, which include actions designed to avoid, minimise and rectify negative impacts. Offsets (sustainable conservation actions) and other conservation actions (capacity building programmes, livelihood initiatives) may then be necessary to compensate for the residual, unavoidable harm to biodiversity and help us to achieve a net positive impact on biodiversity. NPI is a long term goal and a challenge for us. We are working in partnership with international conservation NGOs, who play a key role in progressing our understanding of biodiversity conservation issues and practical approaches to its management. By working together, we aim to raise the bar within the industry sector as a whole. "

Source:
http://www.riotinto.com/ourapproach/5273_biodiversity.asp

Hence, voluntary measures are undertaken by companies on their own account because they feel responsible for their actions within the environment, and not because they are compelled by regulation or legislation.

Increasingly, companies are keen to ensure that their voluntary efforts are regarded as socially acceptable and scientifically credible. A way to do this may be to join up with the Business and Biodiversity Offset Program (BBOP)[4] and make use of their principles, guidance and supporting materials. BBOP is a partnership between companies, governments and conservation experts to explore biodiversity offsets.

BBOP is:
- demonstrating conservation and livelihood outcomes in a portfolio of biodiversity offset pilot projects;
- developing, testing, and disseminating best practice on biodiversity offsets; and
- contributing to policy and corporate developments on biodiversity offsets in order to meet conservation and business objectives.

Its portfolio consists of the following five pilot projects undertaken:
- The Ambatovy Project, Madagascar
- Akyem Gold Mining Project, Ghana
- Bainbridge Island, United States
- Potgietersrust Platinums Limited (PPRust), South Africa
- Strongman Mine, New Zealand

Information on the case studies can be found at: http://bbop.forest-trends.org/pilot.php.

4 http://bbop.forest-trends.org

1.5 Business case for BioCom

Economic activities are a major driver of biodiversity loss. Therefore, there is increasing pressure on governments, politicians, investors and intergovernmental institutions to consider the compensation mechanism as a requirement for biodiversity conservation in national legislation and international conventions. This is reflected, for example, in discussions held at the Tenth Meeting of the Conference of the Parties to the CBD in October 2010. Biodiversity offsets and concepts of 'no net loss' and 'net positive impact' were recognized here. Also, the revision process (2010/2011) of the Sustainability Policy and Performance Standards of the International Finance Corporation could well lead to developments that favour biodiversity offsets. The draft revised text of Standard 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources) makes references, for example, to issues like net positive gains of biodiversity values and more rigor in the application of mitigation measures. A last example of an increasing focus on the principles of no net loss and biodiversity compensation is the Dutch Biodiversity Policy Program 2008-2011, that refers to research to be undertaken on the compensation of unavoidable impacts on biodiversity. The Program refers to the important role that is reserved for the business community in this respect.

Though even without the motive of a legal requirement, a private sector company can decide to compensate for biodiversity loss for the following reasons:

- **Securing the future availability of natural resources indispensable to the company's production**
  There are limits to the degree to which biodiversity and ecosystem services can be used. Conservation and sustainable use of biodiversity resources ensure that resources remain consistent over time and, therefore, help an organization to avoid risks of running out of resources.

- **Gaining competitive advantage by demonstrably operating in a sustainable and responsible way to counterbalance negative impacts on biodiversity**
  Biodiversity receives attention from many stakeholders. Consequently, a company's actions and performance in this field can positively influence the decisions made by government bodies, consumers, suppliers, banks, etc.

- **Strengthening the licence to operate, grow and innovate**
  Consent from a broad range of stakeholders, including governments, local communities, financial institutions, employees, and society, is a prerequisite for conducting business in a successful manner and operating on a long-term basis. An organization's performance on biodiversity can be a factor in obtaining this consent by building a good reputation and trust.

- **Boosting stakeholder relations**
  Stakeholders expect companies to take responsibility for any (in)direct impact on biodiversity resulting from either the company's own activities or from activities in their supply chain. They will also expect ongoing improvements in a company's environmental performance, such as continuous investments and attempts to reduce the biodiversity footprint of its activities.

- **Obtaining experience with regard to the development and implementation of compensation methodologies, keeping one step ahead of anticipated legal or funding requirements**
  Parallel to the carbon credit market, it can be expected that the rate of biodiversity loss and increased scarcity of natural resources will be translated in a certain biodiversity performance standard imposed on the market.

- **Anticipating market demand for 'green' products produced without negatively impacting the environment**
  Business decisions that prepare for changing customer preferences, new regulations, or investor demands can help differentiate a company in crowded product and capital markets.

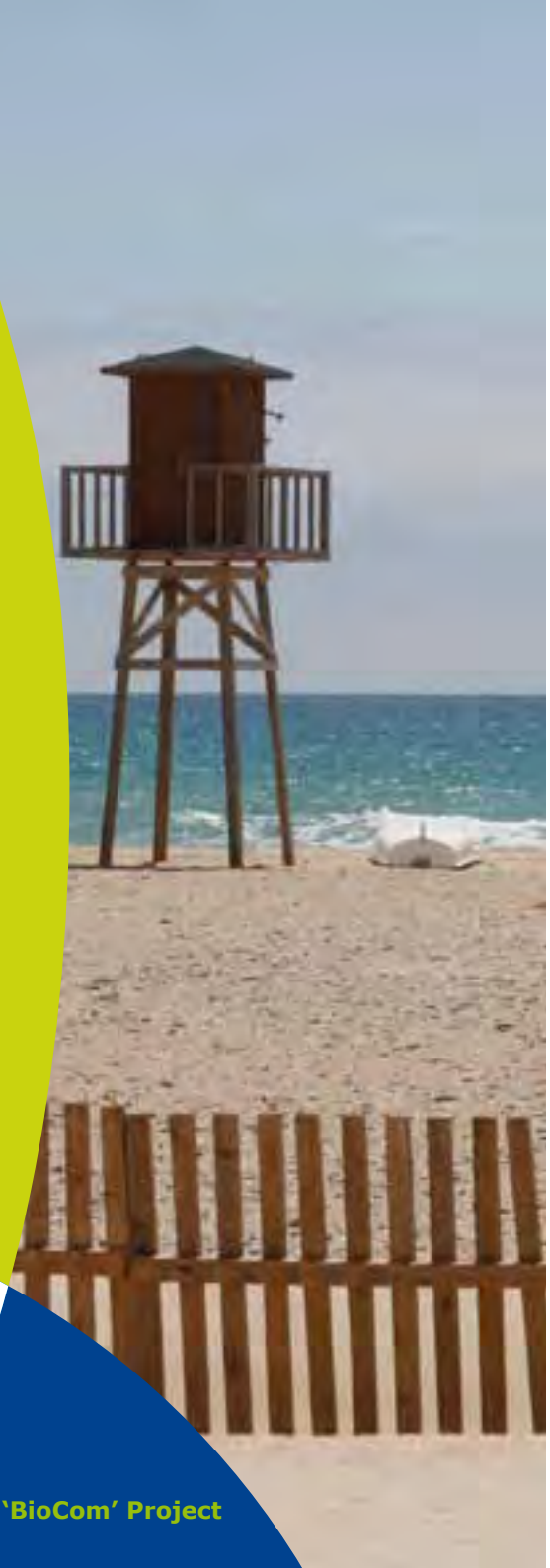
- **Minimizing risks and liabilities**
  Compensation helps to demonstrate environmental stewardship and thus manage risks associated to the use of and/or impact on biodiversity resulting from the company's activities.

There are very few (if any) examples on private sector companies (1) assessing all of their economic activities, including activities from business partners up and down the supply chain; (2) identifying the (potential) negative impacts on biodiversity as a result of these activities; and (3) analyzing how the occurring biodiversity consequences could be compensated for. BioCom piloted this approach with the aim to formulate a practical compensation plan for each of the participating companies and to use the experiences gained for more general guidance on the application of the compensation mechanism. This innovative aspect was either – an attractive proposition for companies to participate in - or - a proposition that will encourage the participation of companies. BioCom also offered the opportunity to influence (potentially) upcoming legislation in the Netherlands: from risk to opportunity.

1.6 BioCom objectives

We developed BioCom with the aim to prepare practical, viable compensation plans for (part of) the business activities of three Dutch private sector companies that have both a direct impact on biodiversity through their actual footprint, as well as an indirect impact through their supply chain partners. The idea has been that by jointly working with private sector companies, NGOs and the government towards such practical compensation plans, the outcome would be fit-for-purpose for the participating companies, acceptable for society and would feed into developing legislation and policy in the Netherlands.

Moreover it would provide insights in the obstacles that prevent mainstreaming the compensation principle and we would learn about unknown potentials for business advantages, practical objections and pitfalls, knowledge gaps, as well as the guidance / support / facilitation potential of governmental bodies and NGOs in the field of voluntary biodiversity.



Annex 1

Existing legislation on biodiversity compensation[5]

5 Source: Joshua Bishop, IUCN, presentation 18 November 2008: Biodiversity and compensation: legal and economic issues (http://www.epbrs.org/PDF/Bishop.pdf).

Legislation and regulation	Country	Elaboration
Federal Clean Water Act	USA	This Act provides for Wetland Mitigation Banking. Mitigation banking has been defined as wetland restoration, creation, enhancement, and, in exceptional circumstances, preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial. For each hectare of wetland destroyed or damaged, one hectare or more of comparable wetland must be restored or recreated. Units of restored, created, enhanced or preserved wetlands are expressed as 'credits' which may subsequently be withdrawn to compensation 'debits' incurred at a project development site. The price of credits includes land acquisition, rehabilitation and endowment of a trust fund for long-term management. Approved credits need to meet agreed performance criteria according to a fixed timetable. They can be used only once and mitigation banks must be conserved in perpetuity. http://www.epa.gov/wetlandmitigation
Endangered Species Act	USA	This Act provides for Conservation Banking. A conservation bank is a site where habitats and/or other ecosystem resources are conserved and managed in perpetuity for listed species, expressly for the purpose of compensating for impacts occurring elsewhere to the same resource values. The aim is to ensure recovery of threatened and endangered species by securing habitat. For every hectare of habitat destroyed or damaged, developers must pay compensation. Compensation may involve the purchase of credits from approved conservation bankers for similar habitat, or "in-lieu-fee" payments to environmental agencies to support species conservation efforts in the service area. http://www.fws.gov/endangered/pdfs/ESAall.pdf

Legislation and regulation	Country	Elaboration
Victoria, NSW, Western Australia BioBanking Scheme	Australia	There is no central piece of legislation that creates a regulatory framework for biodiversity markets in Australia, but rather a range of legal and policy provisions at the Commonwealth and State level that may be used to set up market-based instruments for biodiversity conservation. The New South Wales' BioBanking Scheme commenced in July 2008. The framework for the scheme was established under Part 7A of the Threatened Species Conservation Act 1995 and is supported by the Threatened Species Conservation (Biodiversity Banking) Regulation 2008, BioBanking Assessment Methodology (the methodology) and Compliance Assurance Strategy. Under the BioBanking scheme, owners of land with potential to improve biodiversity values can establish the land as a Biobank site by entering into a Biobanking agreement with the Minister for the Environment. A Biobank site owner can create Biodiversity Credits through management actions carried out or proposed to be carried out that improve biodiversity values on the land. The number of Biodiversity Credits created will be determined according to a methodology prescribed by the Minister. The BioBanking scheme enables Biodiversity Credits to be traded. A register will be kept at the Department of Environment and Conservation to record the creation and transfer of Biodiversity Credits. http://www.ecosystemmarketplace.com/pages/dynamic/web.page.php?section=biodiversity_market&page_name=aumi_market http://www.mallesons.com/publications/2006/Jul/8480241w.htm

Legislation and regulation	Country	Elaboration
Protected Areas Law	Brazil	The Protected Areas Law requires that industrial development projects must offset their environmental impacts, as described in the Environmental Impact Assessment undertaken, through a payment to the National Protected Areas System. The minimum offset is 0.5% of capital costs of the industrial development, and is determined on a case-by-case basis by a regulatory commission. To date, there is no guidance for determining the offset amount or any attempt to determine the equivalence between the environmental impact and the offset benefits. The offset can be directed to any protected area within the national system, unless the industrial development directly impacts a specific park, in which case that park must be the beneficiary. Offset funds must be spent (in order of priority) on: 1) demarcation of protected areas; 2) elaboration, revision, implementation of management plans; 3) acquisition of goods and services for management, monitoring, and protection of areas; 4) studies necessary for creation of new protected areas; and 5) research necessary for conservation management. http://www.ecosystemmarketplace.com/pages/dynamic/resources.law_policy.page.php?page_id=2344&section=library&eod=1
Forestry Code	Brazil	The Forestry Code provisional measures require that landowners must maintain a fixed minimum percentage of natural vegetative cover on their property, varying by region: Atlantic Forest = 100%; Amazon Forest = 80%; Amazon Savannah =35%; all other areas = 20%. The requirement can be satisfied through the use of off-site conservation offsets. State level crediting systems (e.g. conservation banks) are in development in the states of Minas Gerais and Paraná. Equivalence is handled by requiring that the offset is of the same type of ecosystem within the same watershed, and if that is not possible due to a lack of natural vegetation, then the next closest watershed. http://www.ecosystemmarketplace.com/pages/dynamic/resources.law_policy.page.php?page_id=2345&section=library

Legislation and regulation	Country	Elaboration
Fisheries Act	Canada	The Canadian Fisheries Act and associated policy guidelines prohibit the destruction of fish habitat, including spawning grounds and nursery, rearing, food supply and migration areas on which fish depend, directly or indirectly. Any work or undertaking that results in the harmful alteration, disruption or destruction (HADD) of fish habitat is prohibited. Based on the principle of no net loss, the Canadian government has developed guidelines to allow development to take place while conserving and protecting fish habitat. These guidelines include the legal requirement for developers to specify mitigation and/or compensation measures proposed to alleviate potential impacts, and/or to compensate for any loss in the capacity of habitat to produce fish by (in order of priority): relocation (of the project), redesign (of the project), mitigation and compensation (with a hierarchy in compensation options). http://www.dfo-mpo.gc.ca/far-rlp/habitat_prevention-eng.htm http://www.forest-trends.org/documents/files/doc_660.pdf
Protected Areas Law	Mexico	The legislation (LGEEPA) includes measures for the protection of natural areas, exploitation of natural elements (including land and water) and protection of the environment (including atmospheric contamination, water and soil contamination, hazardous activities and waste, nuclear energy and other forms of pollution). In 1996, it was amended to include sustainable development as a priority for the Mexican government. The LGEEPA also sets forth control and safety measures, penalties for non-compliance, guidelines for environmental impact statements and risk assessments. Additionally, the LGEEPA addresses matters of jurisdiction, ecological zoning, and enforcement. Mitigation is described as a set of actions carried out by the company to minimize and restore or compensate for environmental impacts in order to return to the conditions as they were before the disturbance was caused by the realization of the project. http://projects.wri.org/sd-pams-database/mexico/ley-general-del-equilibrio-ecol-gico-y-la-protecci-n-al-ambiente-lgeepa http://vlex.com.mx/vid/ecologico-evaluacion-impacto-ambiental-43534969

Legislation and regulation	Country	Elaboration
Forestry Law	Mexico	The central objective of Mexico's forestry policy is to further the sustainable use of its forest resources so that their significant production potential can be fully tapped without endangering the social assets and services of forest ecosystems. The main objectives of the Federal Administration 2007-2012 in matter of forestry resources are: (1) Reduce the loss of forestry surface, increase the restored forestry surface and protect the capacity of the forest ecosystems to provide environmental goods and services; (2) Promote development and economic expansion from the sustainable use of forestry resources, market access and the productivity increment of the sector; (3) Contribute to the diminishing of the poverty and exclusion indexes that exist in most forest areas through strengthening the social organization and institution capabilities, as well as the training for the adequate use of the forestry resources with the purpose of generating employment and income. http://www.fao.org/UNFAO/Bodies/NAFC/nafc98/NAFC4-E.HTM http://www.conafor.gob.mx/index.php?option=com_content&task=view&id=422&Itemid=504
Western Cape draft provincial guideline on biodiversity offsets	South Africa	This guideline provides the first steps towards using biodiversity offsets as an instrument for environmental management in the Western Cape. It is argued that biodiversity offsets do not replace the responsibilities for on-site mitigation. Biodiversity offsets in the Western Cape will form part of the clearly defined statutory EIA approval process and a specific offset design process is suggested in this guideline. The guideline further provides a framework in which offsets can be recommended by biodiversity impact assessment specialists and environmental assessment practitioners, be proposed by the developers, and evaluated by the authorities. Biodiversity offsets are interpreted as the first step in producing a system where the principle of compensation for biodiversity losses is orderly integrated into a market for biodiversity conservation and restoration. http://www.capegateway.gov.za/Text/2006/5/provincial_guideline_on_biodiversity_offsets_edition1_19may2006.pdf

Legislation and regulation	Country	Elaboration
Federal Law for Protection of Nature & Landscape	Switzerland	This law mandates 'reconstitution' or 'replacement' of protected biotopes where impacts are unavoidable. Article 18 concerns the protection of animal and plant species and provides that, if, having taken all factors into consideration, it is impossible to avoid harm to protected biotopes, the instigator of the harm must take special measures to ensure the best protection possible, reconstitution of the relevant biotope, or, if this is not possible, 'adequate replacement'. http://www.mitigationactionplan.gov/Biodiversity_Offsets_Report.pdf
Habitats Directive (92/43/EEC)	EU	The Directive prescribes that if, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the European Commission of the compensatory measures adopted. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1992L0043:20070101:EN:PDF
Environmental Liability Directive (2004/35/EC)	EU	This Directive seeks to achieve the prevention and remedying of environmental damage - specifically, damage to habitats and species protected by EU law, damage to species or habitats on a site of special scientific interest for which the site has been notified, damage to water resources and land contamination which presents a threat to human health. It reinforces the "polluter pays" principle - making operators financially liable for threats of or actual damage. It sets out requirements that EU member states must enact to prevent and remedy environmental damage. http://www.defra.gov.uk/environment/policy/liability/index.htm

Legislation and regulation	Country	Elaboration
Loan agreements	International Finance Corporation Guidelines of the World Bank, Performance Standard 6 (Biodiversity Conservation and Sustainable Natural Resource Management)	In order to avoid or minimize adverse impacts to biodiversity in the project's area of influence, the company needs to assess the significance of project impacts on all levels of biodiversity as an integral part of the Social and Environmental Assessment process. The Assessment will take into account the differing values attached to biodiversity by specific stakeholders, as well as identify impacts on ecosystem services. In areas of natural habitat, the company will not significantly convert or degrade such habitat unless the following conditions are met: • There are no technically and financially feasible alternatives. • The overall benefits of the project outweigh the costs, including those to the environment and biodiversity. • Any conversion or degradation is appropriately mitigated. Mitigation measures will be designed to achieve no net loss of biodiversity where feasible, and may include a combination of actions, such as: • Post-operation restoration of habitats. • Offset of losses through the creation of ecologically comparable area(s) that is managed for biodiversity. • Compensation to direct users of biodiversity. Possible compensation has to be agreed upon prior to entering into the loan agreement and forms part of the same. The IFC Guidelines provide no general framework for compensation activities. The extent of the same is determined on a case-by-case base, depending on the local situation, knowledge available on local biodiversity values and the impact assessment. http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/pol_PerformanceStandards2006_PS6/$FILE/PS_6_BiodivConservation.pdf

Part 2

Approach and Process

PART II - APPROACH AND PROCESS

Supply chain compensation has been the key feature of our project, an innovative topic in the area of biodiversity compensation. We aimed for at least three companies to develop individual biodiversity compensation plans in cooperation with (some of their) stakeholders. This posed the challenging question: 'How do we need to organize BioCom to realize the results we aimed for?' This section gives insight into the approach and process that has been followed. First, we describe the character of the project and the selection of project partners. Thereafter, we consider the choice for the specific project approach, followed by a description of the project process. We conclude on the effectiveness of the approach.

2.1 BioCom approach

With the compensation of biodiversity impacts still in its infancy, supply chain compensation was unchartered territory. Consequently, the project needed to adopt a learning-by-doing strategy. Exploring new territory did not dampen our aims. We wished to develop biodiversity compensation plans that would be:

- practical, fit-for-purpose, specific for the companies that should implement them;
- science-based;
- acceptable to society in the sense that the result would be accepted as a replacement of the impacted biodiversity and the associated ecosystem services;
- aligned with existing or developing policy and regulations.

Given these aims, the project's circumstances demanded a setting and approach that would create trust, inspiration, out-of-the-box thinking and collaboration. We selected meeting locations in quiet areas in the countryside and adopted a consensus-based approach in which:

- NGOs, the government, scientific experts and businesses would work collaboratively;
- participants would agree on rules of work and communication;
- participants would agree on the work plan;
- participants would share responsibility for the outcomes;
- participants would be equal;
- participants would be in the project from the beginning until the end;
- participants would invest time and resources required for his/her part of the work to be done;
- participants would assign one and the same person to participate in and attend all meetings.

The Dutch government financed the work conducted by scientific institutions and the involvement of process facilitators, and reimbursed costs for meeting facilities. Participants paid for their own project-related costs.

2.2 BioCom partners

We looked for full-presence participation of companies, NGOs and Dutch authorities and selected contributions by scientific institutions. The commitments asked from the full time participants were high: the same representative had to attend all meetings and would not only need organizational commitment and support, but also access to resources (and supply chain partners, if relevant).

Moreover, companies and NGOs needed to feel comfortable by participating in a challenging project like this, given the fact that biodiversity compensation is considered controversial by some stakeholders and/or competitive parties. Furthermore, a lack of results (or failure of the implementation of the compensation plan) could turn against the participants. The starting point of the project was to select a limited number of companies from different business sectors (4 to 5) that would not only have a direct impact on biodiversity as a result of their own business activities, but also indirect impacts through their participation in supply chains. It proved difficult to get companies on board, mainly because many could not commit themselves to the time and resources required. Similarly, it became clear that also a number of NGOs could not participate because of the same constraints.

After two information and participation-soliciting sessions the following parties agreed to 'full-time' participation to the project (with an exception of the knowledge institutions that provided input to selected subjects only):

Dutch authorities

Ministry of Housing, Spatial Planning and the Environment (today: Ministry of Infrastructure and the Environment); www.rijksoverheid.nl/ministeries/ienm
Ministry of Agriculture, Nature and Food Quality (today: Ministry of Economic Affairs, Agriculture and Innovation); www.rijksoverheid.nl/ministeries/eleni

Private sector

BioX Group BV (renewable energy) *(the company was dissolved)*
Koninklijke Houthandel G. Wijma & Zonen BV (timber production and trade); www.wijma.com
Kruidenier Groep BV (food services); www.kruidenier.nl

Non-governmental organizations

Hivos; www.hivos.nl
Wetlands International; www.wetlands.org

Knowledge institutions

IUCN National Committee of the Netherlands (IUCN NL) for biodiversity expertise; www.iucn.nl

Netherlands Environmental Assessment Agency (PBL) for scientific knowledge on calculating the biodiversity footprint of the companies; www.pbl.nl

Project management

Consultancy CREM (content expertise), www.crem.nl; and Sustainability Consulting (process facilitation), www.jpvs.nl

Project supervision

Steven de Bie, Wageningen University and Research; www.wur.nl

Representatives showed affinity with the theme, were committed to participate and dedicated time throughout the project, were mandated – to a certain extent – to speak on behalf of their party and had internal access to the necessary manpower and resources.

2.3 BioCom process

In our selection for an adequate project process, we were guided by the following criteria:

- There should be a continuous possibility for dialogue between the different parties (government, businesses, NGOs, science).
- It should be possible to achieve concrete results in a relatively short timeframe.
- Sound scientific knowledge and current insights should form the basis of the project.
- The scarce time available should be used as efficiently and effectively as possible.

These criteria were best met by the 'Focused-Result-Delivery' (FRD) method, which can be described as bringing people together for a limited period of time (e.g. 30 days) with a clearly defined task and the commitment to deliver on that task ('pressure cooker'). Contact moments with the back office at set times can be allowed to enable the participants to get feedback, data and commitment for the decisions to be made. The concept is about freeing participants from other work and bringing them into a comfortable environment that stimulates creativity; unexpected but realistic outcomes can be guaranteed as such.

However, we did not succeed in implementing the FRD method. The majority of participants indicated during the information sessions that it would be impossible to free themselves from other work and commitments for a short, uninterrupted period.

Without forgoing the essential elements of the FRD approach (efficiency, multi-disciplinary input, alignment and dialogue, creativity, knowledge-based), we increased the project turnover time from a short, uninterrupted period to an extended period of 11 months, and scheduled a limited number of multi-days' meetings over this period. This enabled the companies to gather their data, participants to settle agendas to spend time on the project and knowledge institutions to study and work on the footprint measurements. This format also enabled us to organize two feedback sessions with external experts and stakeholders (so-called Fish Bowls).

Plenary sessions were organized, varying in length from one to three days (including evening programs) with a total of 18 days. The sessions consisted of presentations, dialogues, working groups and other methods that fitted the topic under discussion. Also, they served to discuss and agree on the definitions, principles and conditions for biodiversity compensation as a framework for the development of the plans. Participants reflected on the data gathered, jointly analyzed the data where possible/needed, discussed and set directions for the compensation plans, discussed and agreed on the outline of the compensation plans, and discussed options for compensating the residual impact on biodiversity.

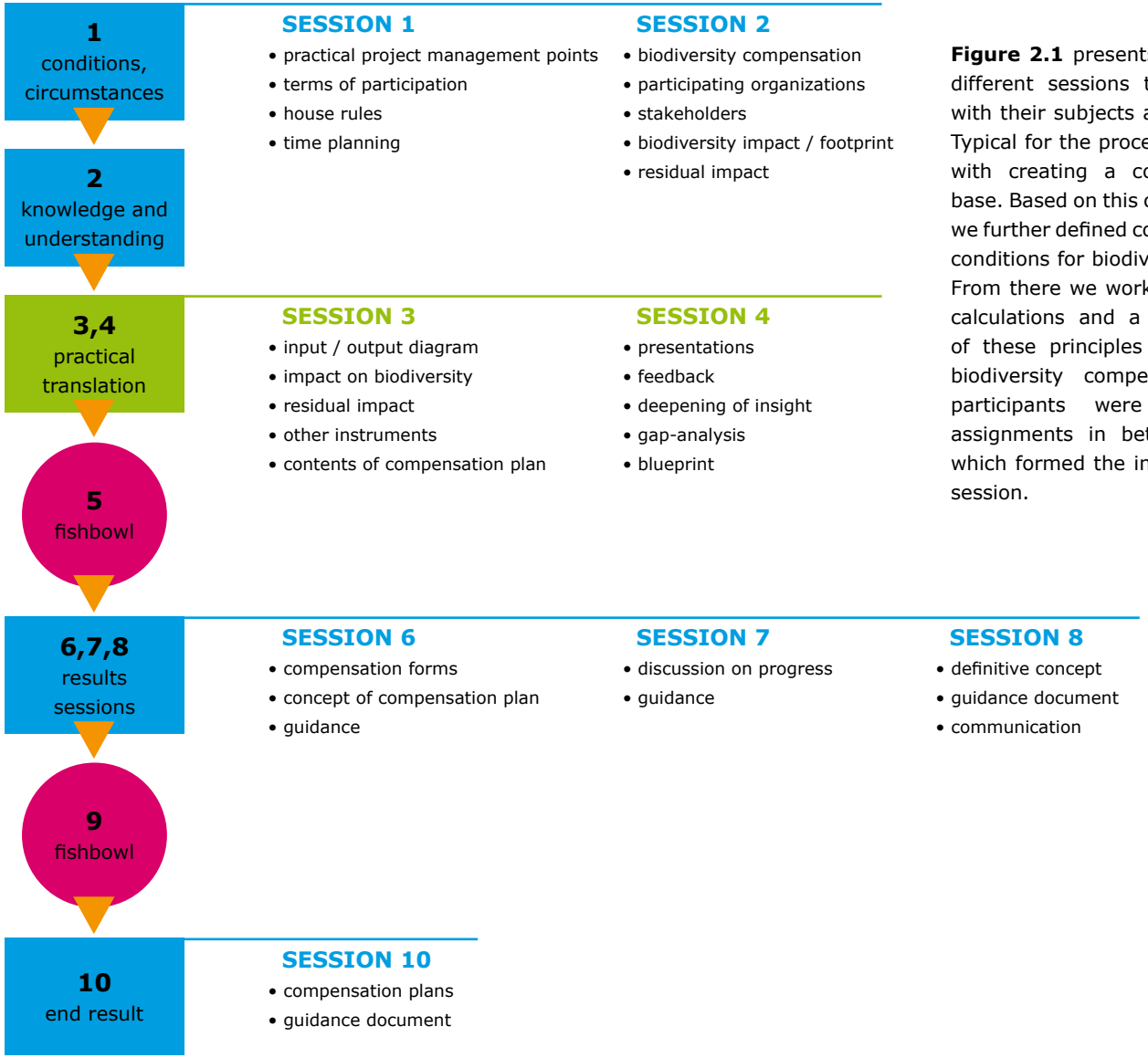


Figure 2.1 presents an overview of the different sessions that were organised with their subjects and expected output. Typical for the process is that we started with creating a communal knowledge base. Based on this communal knowledge we further defined common principles and conditions for biodiversity compensation. From there we worked towards footprint calculations and a practical translation of these principles and conditions into biodiversity compensation plans. The participants were given homework assignments in between the sessions, which formed the input for the following session.

Figure 2.1:
Process steps in the BioCom Project

Other important process aspects have been:

- extensive recordkeeping of all sessions, results and appointments;
- homework in between the sessions (beforehand estimated at 10 days in total, but in reality this was significantly more for the participating companies);
- extensive preparation and facilitation of all sessions, aimed at process, progress and results;
- project support for companies in between plenary sessions with respect to the gathering and interpretation of data and the development of the compensation plans;
- contribution by the Netherlands Environmental Assessment Agency regarding the methodology for calculating the biodiversity footprint of business activities;
- contribution by IUCN NL with respect to biodiversity compensation experience and knowledge;
- setting up three tri-partite 'buddy teams', each consisting of a company, NGO[6] and government representative, to support the company involved in the preparation of its compensation plan by in-depth discussions on the footprint and options for compensation; the buddy groups worked during and in between the plenary sessions and results were shared with all participants;
- external review of the (interim) results of the project at two stages in the process by a broad spectrum of external experts of NGOs, businesses, government and knowledge institutions to give input and feedback on the principles of biodiversity compensation, the footprint calculations and the (developing) compensation plans; the first session was a dialogue about several specific themes (principles) concerning biodiversity compensation; the second session consisted of a representation of a tribunal (role play), in which the companies and their accomplices had to explain and defend in what way and why their biodiversity compensation plans contribute to biodiversity conservation.

BioCom started in March 2008 after two information and participation-soliciting sessions. It finished in December 2008 with the second external review. In February 2009 we agreed upon the final results and closed out the project.

6 Apart from contributing experience and knowledge, IUCN NL performed as NGO in one of the buddy groups.

2.4 Lessons learned on approach and process

This innovative project has been challenging for both the process facilitators and the participants, but commitment of the participants and the trust among all remained high. Flexibility and creativity were demanded throughout the project. Looking back at our experiences gained in BioCom, we learned the following:

- *Time investment* by the companies proved to be significantly higher than that of other participants. The role of the other participants was limited to the identification of stakeholders, searching for data on biodiversity impacts and critically questioning the companies on data delivered to achieve mutual agreement, completeness and clarity. It was noticed (and understood) that the attitude of NGOs and government participants was mostly reactive, as the ownership of the data gathering and development of the plans was agreed to be the responsibility of the companies. However, the disproportional spending of time sometimes created a feeling of dissatisfaction within the companies. Our initial assessment that the investment would be equal for all was therefore not realistic.
- Our original *time estimate* was too low as far as the companies were concerned. This related mostly to the process time it took for the companies to gather data. It turned out that supply chain data is not always easily available. Setting up an environmental management system for their supply

chains to identify impacts and opportunities for mitigation would benefit companies, even for reasons other than biodiversity conservation.

- Which *data* are needed to calculate the biodiversity footprint of a supply chain? As this was the first time for such a project, we could not afford to be too selective on which data would/would not be relevant for calculating the footprint beforehand. Thus resource use and discharge-related data have been collected at the cost of a lot of time. Though frustrating on the one hand, that knowledge provided an excellent opportunity to compose the overall picture and on the other hand to make conscious and knowledge-based decisions. It is an arbitrary boundary between what is relevant and what is not, and as long as general guidance is not available, the case-by-case approach is unavoidable.
- *Collaboration* between different stakeholders can be demanding due to their divergent interests and positions. For example, companies wanted to develop a business compensation plan that would be feasible from a cost point of view. NGOs and the government tried to hold on to the 'no net loss principle', including historical losses, pointing out that current company activities would only take place at the cost of historical losses. Overall, however, it proved to be very fruitful to work in a multi-stakeholder setting as this approach enabled companies to take stakeholders' interest into account from the beginning, receiving their support for the final product.
- *Supply chain compensation* is even more challenging than anticipated. Among other things this was due to the significant number of different impacts, diversity of stakeholders engaged, lack of data and sometimes difficult access to supply chain partners. At the start of the project, the participating companies declared their intention to implement their compensation plan if this would be realistic and feasible. It turned out that too many uncertainties made it difficult for two companies to get a clear picture on feasibility and business consequences regarding costs thus to come to a decision on implementation within the timeframe set. This reality will need to be taken into account during a next project.

2.5 Conclusions

When looking back at BioCom – the process structure, approach, collaboration, experiences and lessons learned – we conclude that the approach chosen for the execution of this project was the right one. One that we would advise to follow again with a similar project embroidering on the knowledge gained. The approach a significant variety of project participants: companies, NGOs, Dutch authorities and scientific institutions. Because of the increase of different know–how, working experiences and expertise, this proved to be a very efficient and valuable experience. Cooperation with stakeholders was a key feature in our project, although it certainly did not preclude some conflict. But it created a common basis to work with and offered opportunities to agree on measures to be taken and goals to be set. Due to this approach the project has been successful: biodiversity compensation plans for three companies have been prepared – albeit in different stages of development – and supported by the participating parties. We have tested the adequacy of these plans in two feedback meetings with a broad group of experts and other stakeholders.

We invested time and energy in an effective process and varied working programme, but also in team building. This proved to be a good choice. A good team is really what makes a challenging and complex job fun and a worthwhile investment. The cooperation between the participants was great.

We dare to say that the adapted FRD method we followed was suited for such an innovative project: it led to significant results in the timeframe set, it integrated the interests of different stakeholders engaged and it ensured that the results were knowledge-based. Overall, we generally worked efficiently and effectively and we organized and implemented the feedback of external parties. The long interval between plenary sessions enabled participants to collect the data needed, however, it also required time during the follow-up session to return to the 'compensation flow'. In this respect, we believe that the original FRD method with a non-stop gathering would deliver a higher output with the same time investments.

The results of the project were received with great interest and encouragement. It was acknowledged that the subject of biodiversity compensation throughout the supply chain cannot be fully explored after one project; the fact that we need more experience is beyond question.

A critical note is that entering into uncharted territory forced us to spend much time on the framing of the approach to supply chain compensation and defining the biodiversity footprint; sometimes perhaps too much time. Although implementation in practice is often much more rewarding and interesting, our experience shows that the theoretical part of supply chain compensation is still in its infancy, in particular: biodiversity footprint measurements that allow quantifiable and integral assessments of company activities. This should be on the science agenda for the coming years.

Part 3

Definitions, principles and conditions

PART III – DEFINITIONS, PRINCIPLES AND CONDITIONS

BioCom followed a step-by-step approach to work towards the preparation of company compensation plans. Creating a combined knowledge basis was one of the first essential steps; agreeing on definitions, principles and conditions to be applied another one. This chapter presents the results of these first steps and shares the definitions, principles and conditions that were discussed and agreed upon in BioCom.

3.1 Introduction

Developing joint compensation plans cannot do without a set of definitions, principles and conditions to delineate the playing field. A 'one size fits all' approach does not exist; there is no generally accepted and agreed upon guidance. One could say that the topic is 'under construction'. This chapter contains the results of discussions within our multi-stakeholder group.

The participants in BioCom discussed and agreed that the following definitions, principles and conditions would frame the execution of the project:

Definitions:
- Biodiversity
- Compensation
- Historical loss
- Indirect effects

Principles:
- Supply chain responsibility
- Biodiversity-business interface
- Methodology to determine the biodiversity footprint
- Currency
- Correction factor
- Like-for-like
- Additionality

Conditions:
- Pre-compensation
- Compensation plan
- Execution of compensation plan
- Long-term assurance
- Stakeholder engagement and communication

3.2 Definitions

3.2.1 Biodiversity

In BioCom we used the internationally accepted definition for biodiversity as presented by the Convention on Biological Diversity (1992). This reads as follows:
"The variability among living organisms and the ecological complexes of which they are part; including diversity within species, between species and of ecosystems"

Starting with this definition, there are a number of relevant issues when discussing biodiversity which are lost in the impact area and biodiversity gained/created in the compensation area. These are:
- *Variety:* Biodiversity is not a static unit. Biodiversity is dynamic and it is affected by compositional changes in space and time.
- *Functionality:* Biodiversity strongly underpins the supply of ecosystem services and therefore human welfare and well-being.

- *Interaction:* The interactions between different species as well as with humans (as one of those species) determine which ecosystems are developed and, consequently, which ecosystem services will be delivered.
- *Resilience:* A resilient ecosystem is easily affected but recovers quickly from heavy disturbances such as fires, flooding, windstorms, insect population explosions, and human activities such as deforestation and the introduction of invasive plant or animal species. Disturbances of sufficient magnitude or duration may force an ecosystem to a threshold. Beyond that point, even when the disturbance is eventually removed, the 'old' biodiversity may not return and a new balance (equilibrium) will be established, often with less/ different diversity.
- *Time-/spatial scale:* Disturbances at certain times and places can cause much larger impacts over time and throughout an area than would be expected from the extent of such disturbance.
- *Value:* Biodiversity has many values for people, including economic and cultural ones, as well as a value 'on its own' (referred to as intrinsic value).
- *Perception:* The perception of biodiversity is related not only to its use, but also to the emotional dimension (we can, for example, enjoy the view of animals and plants).
- *Ownership:* Ownership of biodiversity – and especially of the ecosystem services delivered for which biodiversity forms the basis – is often unclear; it is considered a common good by many. Pricing biodiversity (e.g. through compensation) raises fear with some that biodiversity will be claimed as the payer's property. It could be claimed though, that those who have an interest in biodiversity (either in conservation or use) should have a certain responsibility in its management, conservation and sustainable use.

Technically speaking, biodiversity can be measured objectively as genetic diversity, species richness, and different number of ecosystems (explicitly leaving out the emotional perception). In this respect, biodiversity differs from 'nature'. The questions of 'what is nature' and 'which value should I give to nature' are more emotionally and culturally decided. In practice, however, many people refer to nature and biodiversity without making any distinction. The same applies to the environment, which is also interchangeable with biodiversity for many. The environment can be seen as a framework set for biodiversity with abiotic (non-living) and biotic (living) characteristics. Examples of the abiotic environment include altitude and water balance. An example of a biotic environment characteristic is soil fertility created by soil organisms.

3.2.2 Compensation

The Business and Biodiversity Offset Program (BBOP, see section 1.4) defines biodiversity offsets as follows:
'Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate prevention and mitigation measures have been implemented.'

We took this definition as the basis principle of the start of BioCom, but decided to slightly change this definition to better communicate our views on what compensation should try to achieve. The resulting definition now reads as:
'Biodiversity compensation comprises a set of actions that lead to measurable conservation outcomes, designed to compensate for residual negative biodiversity impacts that arise from the activities of an existing or new project and that remain after appropriate prevention and mitigation measures have been implemented.'

There are two possible approaches to the principle of compensating for biodiversity loss:

1. **Real compensation** ('offset'): on-the-ground identification of the potential loss of biodiversity due to the taking of land for the purpose of a new project or activity (preceding the start of such project or activity), and the design of compensation formats for that potential loss.

2. **Compensatory conservation:** identification of the loss of biodiversity due to key drivers of destruction (including historical loss), that occurs as a result of an existing or planned project or activity, and of options to compensate for that loss.

The first approach, real compensation or offsetting, refers to predicted residual adverse impacts on a habitat and/or its associated species arising from project development, that are made up by taking measures to enhance, restore or create a habitat to achieve no-net-loss of habitat and/or species (like-for-like). This offsetting is forward-looking and based on (thorough) studies in the field; it is the BBOP approach. The second approach focuses on all possible drivers for biodiversity loss (including by-products of production processes such as emissions and waste) as a result of existing or planned activities, not even excluding historical loss. The residual adverse impacts are to be matched with conservation actions.

In BioCom this included the residual impacts from supply chain activities carried out to enable the compensating company's activity to take place.

The ultimate goal set by both BBOP and BioCom is to ensure a 'no net loss', or preferably a 'net gain' of biodiversity in the sense of species composition, habitat structure, and ecosystem functioning and services, including human usage and people's cultural values.

Speaking about the definition and content of compensation raised the question: Should a degraded area or (just the opposite) an area with a high biodiversity value be given a preference for compensation 'investments'? It could be argued that investing in areas with a high biodiversity value is preferred. Should there be a risk of damage or degradation of this biodiversity without such intervention? The issue then becomes one of preventing losses and therefore brings the question to: can loss also be compensated by the prevention of loss? That discussion touches upon climate compensation discussions in which the REDD+ mechanism has been introduced: Reducing Emissions from Deforestation and Degradation. This mechanism allows parties to gain carbon credits for conserving existing forests.

Figure 3.1 *(next page)* illustrates the above in more detail.

Figure 3.1 can be elaborated as follows:

- **Situation 1** concerns the impact site where economic activities are taking place. The upper line indicates the background rate of autonomous biodiversity decline; the lower line indicates the biodiversity decline resulting from the economic activities being undertaken. The orange coloured part is the additional loss in biodiversity caused by the economic activities in this impact area.

- **Situation 2** concerns a compensation site with a degraded, low biodiversity value. The lower line shows the continued autonomous decline, should no conservation measures be taken to restore the value. The upper line shows the upward trend of the biodiversity status when compensation actions are taken in this area to restore the biodiversity. The green coloured part is the biodiversity gained in this compensation area.

- **Situation 3** concerns a compensation site with a high biodiversity value, though still somewhat degraded over time. The degradation will autonomously continue when conservation measures are lacking, as is represented by the lower line. Compensation actions can help to bring the biodiversity level back to its original level, following the upper line. The pink coloured part is the biodiversity gained in this compensation area.

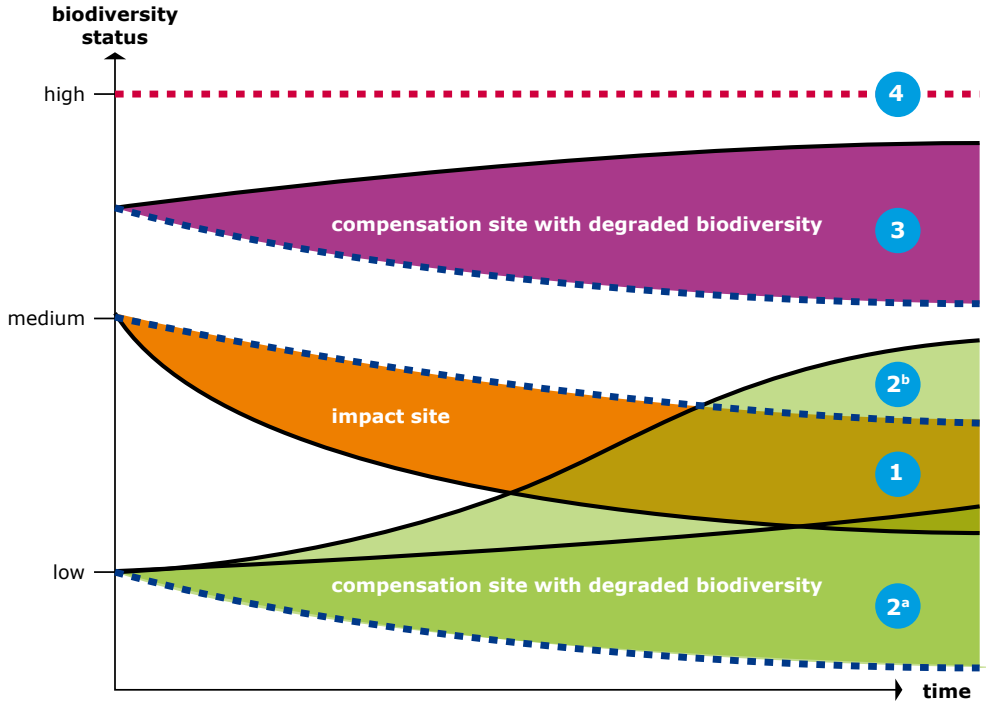


Figure 3.1: No net loss of biodiversity measuring against the baseline

Should the proportions of the compensation site equal the impact site, this would mean that 'no net loss' has been achieved. If the proportions of the compensation site exceed the impact site, a net gain in biodiversity has been achieved.

- **Situation 4** concerns a biodiversity-rich area which would be under threat without intervention. Compensation actions are directed at maintaining the current level of biodiversity. There is no biodiversity gain, but avoidance of degradation taking place is aimed for (e.g. REDD+).

impact site 1
autonomous biodiversity decline
1 biodiversity decline with project

compensation sites 2 + 3
autonomous biodiversity decline
2a 3 biodiversity status with compensation, achieving no net loss
2a + 2b biodiversity status with compensation, achieving net gain in biodiversity

compensation site 4
avoidance of biodiversity degradation

3.2.3 Historical loss

When human activities are absent in a certain area, the biodiversity level in that area can be considered 100% natural biodiversity. The original biodiversity is negatively impacted when a natural area is converted into a production area. Depending on the subsequent variety of activities and management in the production area, the biodiversity level gradually deteriorates, remains more or less the same or is enhanced over time.

Historical biodiversity loss can be defined as:
'The difference between the 100% original natural biodiversity and the biodiversity still present upon the start of the company's presence or influence.'

The BioCom discussion on historical loss focused on the question whether a company should bear the responsibility for the collective historical biodiversity loss in an area the company is active in or dependent upon or only for losses occurring today as a result of its current impact on biodiversity. Given the supply chain context of BioCom, historical losses in this respect do not only refer to historical losses in the activity area of the company itself, but also concern historical losses that occurred throughout the supply chain. As such this touches upon the topic of supply chain responsibility (see section 3.3.1).

Different approaches can be followed towards historical loss:

No, but...approach
The assumption is that a company is only responsible for the biodiversity losses resulting from its present activities. The rationale for this approach is that the conversion of biodiversity-rich areas and consequent biodiversity loss can be attributed to a set of actors (and factors!) in the past. It would therefore be unrealistic to assume that only one company will today bear full responsibility for this loss. Companies could voluntarily choose to cover (some of the) historical losses (own and/or in the supply chain) for reasons of ethical trading, marketing or enhancing their relationship with stakeholders.

A part of... approach
The company is willing to compensate for a part of the historical losses, because it realizes that it would not be able to execute its activities today without land conversion in the past. However, the extent of the compensation is subject to debate. A cut-off date could be a solution to decide for which part the company should compensate. A possible cuff-off date could be the date on which the Convention on Biological Diversity entered into force (1992) or 2010 as the International Year of Biodiversity. Another option could be to link to sector/product initiatives that refer to a cut-off date in the context of biodiversity. A clear example in this respect is the cut-off date set by the RSPO (see below).

Yes, but...approach
In this approach a company strives for historical losses to be fully incorporated in the company compensation plan as the ongoing activities prevent the area from returning to a 100% natural biodiversity state. Considerations such as budget determine in practice the extent to which the company is indeed capable of complying with this approach.

Whether historical losses should be accounted for is a question that also emerged in the debate around the assessment of suitable criteria for sustainable palm oil production in the Roundtable for Sustainable Palm Oil (RSPO). In that discussion a cut-off date for deforestation per November 2005 was agreed upon[7]. This involved that deforestation in biodiversity-rich areas would only need to be accounted for after that date.

7 RSPO Principles and Criteria for Sustainable Palm Oil Production, Criterion 7.3: http://www.rspo.org/sites/default/files/RSPO%20Principles%20&%20Criteria_0.pdf

3.2.4 Indirect effects

Indirect effects are generally known as either (1) impacts following from the direct effects caused by company activities, or (2) impacts resulting from activities of supply chain partners. Examples of the first type of indirect effects are:

- *Leakage,* i.e. displacing threats to biodiversity somewhere else. This means that the company's activities in themselves do not pose an additional threat to biodiversity, but biodiversity loss occurs due to the response of other companies to these activities. An example: a company extends its agricultural production to an area that is already intended for agricultural production. In theory, this does not result in additional biodiversity loss, given the fact that agricultural production already took place in this area and is to be continued, only now with a new company. When the previous owner of the land moves to a biodiversity-rich area and cut the forest over there to start his own new agricultural production. This is referred to as leakage.
- *Illegal forestry* or *hunting* as a result of opening up previously inaccessible areas. An example : a company starts to mine in a backwater as a result of which roads need to be constructed to access the area. This opens up the natural area surrounding the mining pit for those trying to illegally benefit from the existing biodiversity.

The occurrence of such indirect effects often results from a combination of political, economic and social circumstances, such as a lack of local land use planning, poor legal enforcement, and an ever increasing demand for natural resources or poverty.

The second type of indirect effects refers to impacts on biodiversity up and down the supply chain, hence not caused by the compensating initiator itself. For example in the case of traders in agricultural produce: the traders themselves probably have a limited impact on biodiversity, but the produce they buy and sell might have needed significant natural resources to grow.

The discussion on the occurrence of indirect effects is often linked to the discussion on supply chain responsibility. To which extent can a company be held responsible for indirect effects taking place? Companies are mostly not responsible from a legal point of view for the occurrence of indirect effects, though ethical motives can inspire a company to take them into account anyway. Investors can impose conditions in this field as well, asking companies to analyze the risks in the context of 'areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location'[8]. When developing and implementing compensation plans, it makes sense to map the risks for indirect effects that might occur and take precautionary measures where possible.

8 International Finance Corporation, Performance Standard 1, section 5: http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/pol_PerformanceStandards2006_PS1/$FILE/PS_1_SocEnvAssessmentMgmt.pdf

3.3 Principles

3.3.1 Supply chain responsibility

Which direct and indirect impacts on biodiversity should a private sector company take responsibility for? Should it be only those impacts in the supply chain that the company is able to influence or control, or should the company account for all impacts in the supply chain, both upstream and downstream, because it is dependent on each of the parts involved? This question forces a company to look at the boundaries to be set for its responsibility; boundaries that are acceptable for both the company itself and its stakeholders.

In the context of BioCom, supply chain responsibility is defined as:
'Taking responsibility for the compensation of impacts on biodiversity up and/or down the chain of suppliers and customers that arise from activities which are beyond the immediate control of the company.'

Responsibility is often clear from a financial point of view: it concerns the activities for which a company bears legal responsibility. However, supply chain management and responsibility are rarely limited to legal aspects. It predominantly focuses on ethical topics in the field of sustainable development for which no legislation exists. Companies might take responsibility for issues beyond legal compliance (so-called 'secondary responsibility'). Some of the impacts in the supply chain can be managed directly, e.g. transition to an assortment of certified products or to a different supplier. But how to deal with impacts that cannot be (immediately) addressed by the company because the company is too small to enforce changes in the supply chain or trades commodities of unknown origin? This asks for a more innovative approach like cooperation with competitive companies to enlarge purchasing power and capacity to change supply chains, or a change in business, e.g. from mainstream production of tomatoes to organic production. Another option is to work with sustainability certificates, like what is happening in the soy and palm oil trade and with the sale of green electricity. The seller must demonstrate sustainability certificates which ensure that a quantity equalling the sale of the 'sustainable' product has been produced in a more sustainable way. This approach is often used in supply chains of commodities. One of the arguments to work with sustainability certificates is that the full tracking and tracing would involve too high costs.

It should be recognized that what is considered to be 'sustainable production' is a production that is characterized by a balance between 'people, planet and profit' aspects. Although it can be expected that such sustainable production has less negative impacts on biodiversity as a result of the avoidance of certain pressures and the application of specific mitigation measures, residual negative impacts on biodiversity can still occur.

Generally, the actual supply chain responsibility taken is based on two pillars:

Societal pressure: If stakeholders, in particular consumers and investors, feel that a company should take responsibility for certain aspects, this generally has a spin-off on the business policy of that company.
Feasibility: The feasibility for a company to carry the (historical) biodiversity burden caused by the entire supply chain.

Ideally, each supply chain partner takes responsibility for its own biodiversity impact, including end users. Pressure by non-governmental organisations, governments and frontrunners is often needed to set larger scale supply chain responsibility into motion.

3.3.2 Biodiversity-business interface

The activities of a private sector company require goods and services that biodiversity provides as input for its production processes (see figure 3.2). Examples of such inputs are land, raw materials, water and energy. This consumption causes an impact on biodiversity. A company also produces 'discharges' as a by-product of its activities, such as emissions, waste, radiation, light and noise. These can also have an impact on biodiversity.

Boundary setting is necessary with regard to the extent of impacts. The production of capital goods (such as machinery) as well as of other inputs (such as fertilizers) – for which the (majority of) biodiversity impacts could theoretically be calculated – was excluded in our approach.

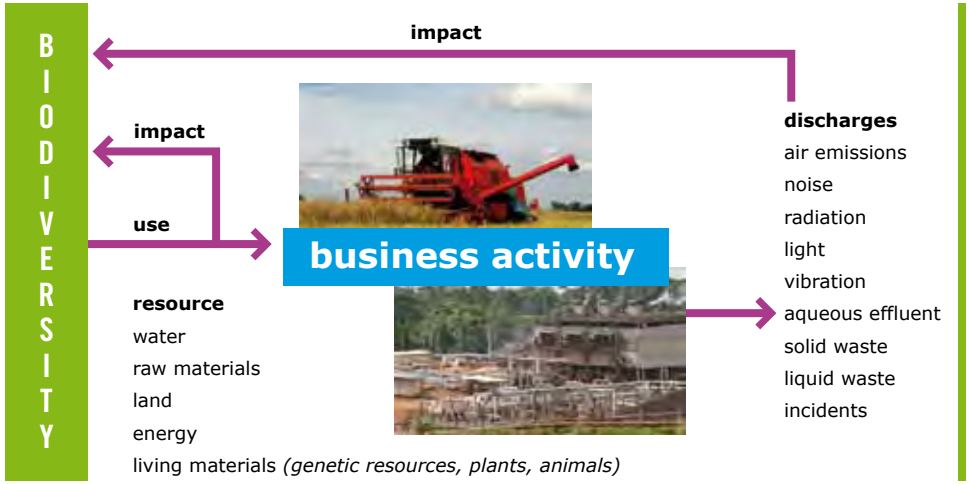


Figure 3.2 Impacts from business activities on biodiversity

3.3.3 Methodology to determine the biodiversity footprint

We define 'biodiversity footprint' as the summation of all pressures that have potential consequences for biodiversity (remaining after the mitigation), translated into units for compensation.

Many biodiversity compensation and offset schemes measure the original biodiversity at the site to be impacted and use these data as a starting point for the compensation plan. This approach was not suitable for BioCom. First, we are dealing with existing activities. This means that the original biodiversity at best can be assessed, but no longer can be measured at the production site. Moreover, most offsetting schemes focus exclusively on land take. By looking at supply chains, we run into pressures impacting biodiversity to a larger extent, and that were much more diverse, e.g. water use, energy use and emissions.

We decided to follow a certain number of steps to determine the companies' biodiversity footprint. These are:

1. Describing the company activities (including supply chain)
2. Collecting data of each composing part of the activity in terms of input and output 'pressures' (see figure 3.2), including historical loss, if applicable
3. Determining the biodiversity footprint
4. Identifying extra mitigation measures (EMMs)
5. Identifying the residual biodiversity footprint after implementing the EMMs

In broad outline, this follows the steps in the Environmental Impact Assessment methodology.

3.3.4 Currency

Within BioCom, we sought for models to translate the accumulated negative impacts into a footprint. Similar to the 'climate change' theme where emissions to air can be translated into a CO_2 equivalent, we thought that such a translation of all pressures into one unit would be useful in compensating biodiversity loss. We were able to categorize the quantified impacts into four pressure groups:

- Land use change
- CO_2 emissions and equivalents
- Water use
- Miscellaneous

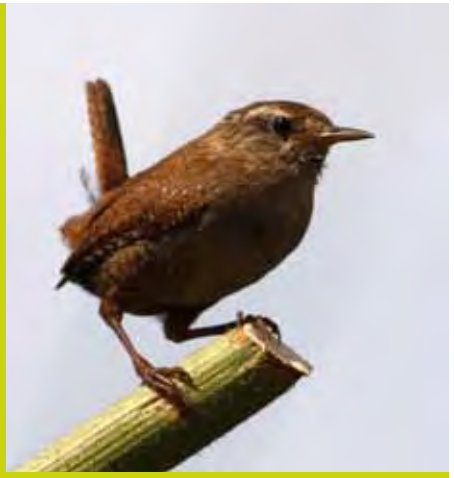
Where it was possible, we translated pressures into area or land taken, as compensation can then take the form of land being set aside for biodiversity. Noise, vibration and light can be translated relatively easily into disturbed areas. Emissions such as CO_2 have their impact on biodiversity through climate change affecting habitat quality and characteristics. Water use is a measure for the consumption of the provisioning service 'fresh water', and can also be an indirect measure for habitat quality. There are, however, pressures that cannot be expressed in any of these three groups. We put those collectively in a so-called 'miscellaneous' category.

We did not succeed in finding one currency that could express the impacts of all different pressure groups. Therefore, we decided to calculate a net biodiversity footprint for each of the four different pressure groups:

Land use change

The currency used to calculate the impact on biodiversity as far as land use is concerned, is hectares. We concluded that the size of the compensation area did not need to be as large as the total number of hectares of land taken. This is the result of the fact that there is still some biodiversity left in the production area, for example birds, vegetation and soil organisms. Within BioCom we applied the MSA (= Mean Species Abundance) methodology to calculate the effect of a certain activity on the remaining biodiversity as a result of land use pressure (see box 3.1). The index referred to is based on a database listing

Box 3.1:
Mean Species Abundance



The Mean Species Abundance (MSA) index provides information on the occurrence of species and their abundance present at any time compared to that in an undisturbed reference situation. The originally present natural biodiversity is by definition referred to as '1' (MSA = 100%), a situation with all original biodiversity being absent is referred to as '0' (MSA = 0%).

A simple example shows the usage of the MSA methodology:

Impact area : 10 ha
Residual MSA score : 0.1
Compensation area : 9 ha of originally present habitat

Source: Alkemade, R., van Oorschot, M., Miles, L., Nellemann, C., Bakkenes, M. en ten Brink, B. (2009) GLOBIO3: A Framework to Investigate Options for Reducing Global Terrestrial Biodiversity Loss. Ecosystems 12, 374-390.

the residual biodiversity value (expressed in MSA: Mean Species Abundance = Abundance of species relative to the original, undisturbed situation), which represents the degree of the ecosystem's natural state.

Although pressures such as noise, fire, vibration and light can be translated relatively easily into number of hectares of area disturbed, at present there is no literature held in the MSA database that accounts for these pressures. Disturbance has therefore been incorporated in the 'miscellaneous' pressure group.

CO_2 emissions and equivalents

Studies, including reports from the Intergovernmental Panel on Climate Change (IPCC AR4), show that – globally – greenhouse gas emissions negatively impact the level of biodiversity (although there may be positive examples on the local level). Some global models even connect CO_2 emissions to a specific rate of biodiversity loss[9][10].

Different supply chain activities can cause the emission of greenhouse gasses to occur, such as:

- conversion of land, as a result of which large quantities of CO_2 are being released into the atmosphere, especially when it originally concerns forested or peat areas;
- use of fossil energy for electricity, heating and transportation fuels, emitting CO_2 and other compounds;
- methane emissions (CH_4, e.g. resulting from livestock activities).

It appeared to be very difficult to translate CO_2 (equivalent) emissions into meaningful figures of area of biodiversity loss. Therefore, the currency used to express this impact group is tons of CO_2 equivalents.

Water use

Water footprint models that allow to translate the footprint of an individual company or a supply chain universally into units of biodiversity effected, do not yet exist. Models developed at this stage generally explore the relationship between (virtual) water use and water stress[11]. Though when a company's water footprint can be measured, a further step is still required, i.e. the connection between water use and biodiversity loss.

Within BioCom, the currency used for water use is liters. We assessed water use pressure in the different parts of the supply chain on the basis of global water stress models. For each of the supply chain activities, it has been decided – on country level – whether water shortage is or would be an issue, either now or in 2030. We do recognize the strong limitations of this model. Water stress can occur locally and create adverse biodiversity impacts in countries that do not experience water stress on a national level. Field work on the ground is necessary to assess local water needs and storage.

Miscellaneous

Impacts that cannot be attributed to one of the previous three pressure groups have been aggregated in the group 'miscellaneous'. Examples of such impact sources include ecotoxicity due to the use of pesticides or the occurrence of heat. Their effects on biodiversity are generally difficult to quantify and hence possibilities to compensate these impacts are variable. Most often it will require a disproportionate amount of work to determine exactly their footprint (if at all possible) compared to the magnitude of the impact and the biodiversity compensation gains in expectation. A correction factor (see section 3.3.5) can be a suitable instrument to use in these cases.

As referred to under 'land use change' above, disturbance to biodiversity due to noise, vibration and light has also been incorporated in this group.

9 Thomas, C.D., Cameron, A., Green, R.E., Bakkenes, M., Beaumont, L.J., Collingham, Y.C., Erasmus, B.F.N., de Siqueira, M.F., Grainger, A., Hannah, L., Hughes, L., Huntley, B., van Jaarsveld, A.S., Midgley, G.F., Miles, L., Ortega-Huerta, M.A., Townsend Peterson, A., Phillips, O.L. en Williams, S.E. (2004) Extinction risk from climate change. Nature 427, 145-148.

10 van Vuuren, D.P., Sala, O.E. en Pereira, H.M. (2006) The Future of Vascular Plant Diversity Under Four Global Scenarios. Ecology and Society 11, 25

11 van Oel, P.R., Mekonnen, M.M. en Hoekstra, A.Y. (2009) The external water footprint of the Netherlands: Geographically-explicit quantification and impact assessment *Ecological Economics* 69, 82-92.

3.3.5 Correction factor

A correction factor is applied to an existing compensation measure to account for impacts that (currently) cannot be translated in an adequate biodiversity footprint currency. The objective is to acknowledge such impacts on biodiversity and translate these into a compensation effort, even if there is no direct link between the impact identified and the impact for which this currency is 'normally' used. A correction factor can also be applied to increase the initial compensation calculated in order to achieve no net loss of biodiversity in the face of uncertainties and risks.

When would it be attractive to implement a correction factor?

- Especially when compensation of activities of supply chain partners is being considered, a data gap is often unavoidable. In such cases a correction factor could be adopted to arrive at a best estimate for the full impact on biodiversity, using the company's own impacts as the basis for the calculation.
- Equally, a correction factor might be useful when research on the ground would be necessary to collect the impact data but so expensive to an extent that it is hardly feasible to have this to be executed. An example is the use of chemical pesticides. Through runoff, this causes a biodiversity effect on a larger scale than on the agricultural field itself. As the effects are difficult to specify, a correction factor could be used in this case.
- When footprint calculations cannot deliver the desired outcome to determine the level of biodiversity compensation due to a lack of adequate methodologies (e.g. for impacts in the range of 'miscellaneous'), a correction factor might be a suitable alternative.
- Biodiversity compensation is in its infancy and ensuring no net loss is difficult. Therefore, a correction factor can be introduced to counterbalance any risks of failure when implementing the compensation scheme and thus increasing the chance of successfully achieving a no net loss situation in practice.

In all these situations, a correction factor will help to get better assessments of the desired compensation level and for companies to feel more secure that minimally a no net loss situation will be achieved.

We suggest that the magnitude of the correction factor be decided on a case-by-case basis, in consultation with stakeholders. An educated guess done by experts is one of the options that can be applied.

3.3.6 Like-for-like

Generally, the demanded outcome of compensation schemes is 'no net loss'. No net loss implies that the total amount of biodiversity gained in the compensation area (i.e. magnitude, quality and quantity) is equal to the amount of biodiversity lost due to the company's activities. This outcome makes sense, though in reality no two hectares are ecologically identical, hence striving for no net loss is therefore a demanding task. Like-for-like is often easiest to achieve if the geographical distance between the impact and the compensation area is limited, since the chance on environmental similarity (from soil type to vegetation structure) is higher. This would be the most desirable option from the view of the local use of ecosystem services and the social impacts of biodiversity loss as well, although distances in this respect are simply too vast for compensation to be of social use when taking place outside the immediate vicinity of the impact area.

In some cases the 'best conservation outcome' may be a more worthy target and perfectly justifiable towards stakeholders. Compensation would then be 'unlike-for-like'. Such solutions could well create much higher biodiversity gains and show more additionality (see below). They could address (national) conservation priorities and/or conserve critically endangered ecosystems and species. The risk of a broad application of the term 'best conservation outcome', however, is that it can invite companies to search for the easiest and/or cheapest compensation options rather than assessing local opportunities and needs. Moreover, it can lead to the degradation of certain ecosystems and ecosystem services that are being overexploited and not maintained or gained in another place.

3.3.7 Additionality

There is a need to ensure that compensation measures concern measures additional to otherwise existing or planned measures to conserve biodiversity. Compensation should not replace activities that would otherwise already be executed by other parties, such as government bodies, through e.g. protected area management plans. The current quality and quantity level of the biodiversity in question is not decisive in this respect.

Additionality can easily be demonstrated in areas with low or degraded biodiversity that are given a boost by the compensation measures. But also in areas with a high biodiversity value where it can be shown that without interaction there is a risk of biodiversity being damaged or degraded. From a compensation point of view, the magnitude of the biodiversity lost (quantitatively and qualitatively) should at least be compensated. From an additionality point of view, it is essential to establish that the biodiversity gains aimed for in a certain area would not be achieved without the intervention of the company.

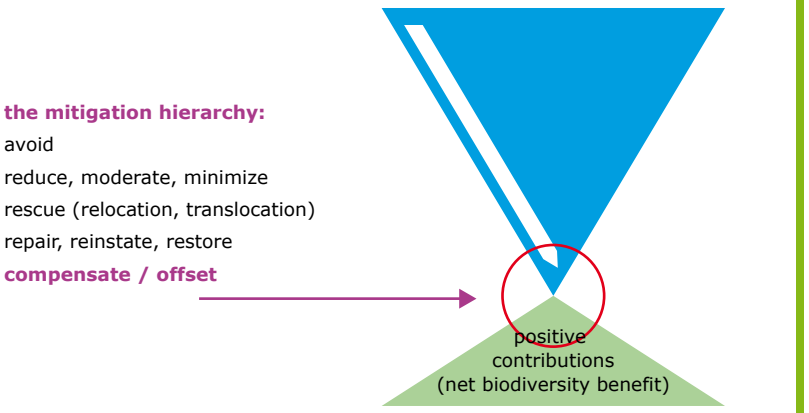


Figure 3.3: The mitigation hierarchy
Source: Business and Biodiversity Offsets Program (BBOP); http://bbop.forest-trends.org/offsets.php

3.4 Conditions

3.4.1 Pre-compensation (or mitigation)

Critics of compensation often use the argument that allowing companies to compensate for their impacts would give them a 'carte blanche' to undertake all sorts of biodiversity-impacting activities. However, it is agreed within BioCom and mostly all compensation schemes, that compensation of impacts on biodiversity is only an option after a company has first taken mitigation measures (the pre-compensation process) to avoid or minimize its (in)direct impacts.

This is understood as:

- *Avoiding* negative impacts, such as avoiding (new) activities in naturally pristine areas through relocating to or starting activities in industrialized zones.
- *Reducing/moderating/minimizing* negative impacts, for example by changing the design of an activity thus aiming for lower impact levels.
- *Rescuing* biodiversity through the installation of a badger tunnel under a highway, for example.
- *Repairing/reinstating/restoring* negative impacts, e.g. through end-of-pipe technology such as effluent handling.

The pre-compensation process is referred to as the 'mitigation hierarchy' (see figure 3.3).

We agreed that it cannot be generally decided upfront as to what extent mitigation – i.e. beyond the minimum legislative requirements – can take place. Technical and financial restrictions will arise. Relevant aspects to be discussed and agreed upon, preferably with stakeholders, when companies go through their pre-compensation process are:

- *Focus:* Which business activities should be taken into account when determining the impact? In BioCom we agreed to include at least (some) primary business activities and processes. In this context the width of the supply chain is important: the scale of activities, procurement and sales by a business.
- *Supply chain responsibility:* Which direct and indirect impacts should and can a company take responsibility for? Can influence in the supply chain be used to enforce mitigation measures? See also section 3.3.1 for an elaboration on this topic.
- *Impact determination:* When is an impact considered a negative impact, how should reversible and irreversible changes be dealt with? On top of that there is the time and space aspect (scale) which means that impacts could arise in a broader area and/or further away in the future than first envisaged.
- *Mitigation measures:* Where does mitigation finish and compensation start? This depends on the costs of mitigation in comparison with the benefits they bring. The key question here is: 'what are the drivers for mitigating impacts beyond laws and legislation; licence to operate, technological possibilities or societal support/demand?' This varies between companies and business sectors.

If activities are yet to start in biodiversity-sensitive areas, companies may also consider the option of 'no go' prior to applying the mitigation hierarchy. Companies should in any case be aware that compensation of negative impacts in such areas could be deemed unacceptable by NGOs and other stakeholders. Companies take the risk of being accused of applying the compensation principle as a 'licence to destroy'.

After applying the mitigation hierarchy there always remains a (historical) impact on biodiversity, the 'residual impact'. Once translated into units for compensation, it is called the *net biodiversity footprint.* Compensation of this net footprint is the next step that a business can take in order to eliminate its residual effect on biodiversity or to even deliver a positive contribution.

3.4.2 Compensation plan

The participants of BioCom have discussed and identified a number of aspects that need to be adhered to during the preparation and/or implementation of compensation plans. The result of our discussions is a list of topics that includes, but is not limited to:

- *Mitigation hierarchy:* Demonstrating the application of the mitigation hierarchy prior to compensation.
- *Cumulative effects:* Taking into account the cumulative effects in the area of operation– a company's use of natural resources can look sustainable but may cross ecological boundaries in the cases of many users.
- *Stakeholder engagement:* Engaging relevant stakeholders in the preparation and implementation of compensation plans.
- *Science-based:* Making use of (recent) scientific insights and data.
- *'No-net-loss':* Favouring a 'like-for-like' format, but flexibility is important; in some cases the 'best conservation outcome' may be a more worthy target (see section 3.3.6).
- *Timing of compensation:* Considering when compensation is about to take place (when starting new activities; compensation should preferably be in place before starting the new activity).
- *Duration of compensation:* Defining the period of time during which the compensation area is guarded against future negative impacts.
- *Location:* Comparing the location of the compensation area with the area that is being compensated for.
- *Additionality:* Ensuring that compensation measures contain something additional to existing or planned measures to conserve biodiversity.
- *Land and user rights:* Respecting existing land and user rights during the purchase, design and management of the compensation area.
- *Transparency:* Ensuring insights in the logic behind the decision to compensate and the shape that is given to compensation.

- *Proportionality:* Comparing the efforts, costs etc. linked to the implementation of a compensation plan to the impact on biodiversity occurring.
- *Synergy:* Striving not only for benefits to biodiversity, but also to stakeholders such as local communities.
- *Costs:* Ensuring that the costs remain manageable and arrangements be made with regard to the allocation of costs.
- *Problem shifting:* Not setting any mechanisms negative to biodiversity or related stakeholders in motion as a result of the implementation of the compensation.
- *Feasibility:* Developing measurable compensation plans for practicality.
- *Responsibility:* Defining deliverables and responsibilities beforehand.
- *Monitoring and reporting:* Mapping the starting point of biodiversity, targets, measures taken and their effectiveness, and verifying that agreements made on improvements are to be realised.

3.4.3 Execution of compensation plan

Biodiversity compensation is a relatively new tool in the process of being developed. Therefore, most compensation plans are being developed on a case-by-case basis in cooperation with stakeholders. The actual implementation of compensation plans can be organized – roughly speaking – in four different ways:

1. The *use of existing systems or initiatives to compensate for the company's impact* (such as banking systems). An example in this respect is the wetland banking system in the United States, offering wetland credits to companies needing or wishing to compensate for their negative impacts on wetlands. This eases the process, especially as far as stakeholder engagement and searching for offset areas are being concerned, though diminishes control with the compensating company. Moreover, it remains to be seen if the relative context between the credits and the impacts in the production area is deemed sufficient.
2. The *execution and management of the drafted compensation plan is outsourced to a third party.* This reduces control and ownership of the compensating company (and possibly creates less internal commitment), though it offers the possibility to seek and involve expert parties and increase efficiency.
3. The compensating *company remains in full control of all aspects of the execution of the compensation plan*, including stakeholder engagement. Although ownership and commitment will be high in this option, the company should realize that it is time-consuming and, since it is not part of the core business, requires different skills than might be present in the company.
4. The most ambitious option is to *set up a new compensation system, e.g. a biodiversity compensation bank relating to the realm in which the company is active.* It offers opportunities for (1) creating clear links between the type of impacts typical for the sector and the contents of the compensation, (2) upscaling, and (3) control.

3.4.4 Long-term assurance

It is important for both the company and its stakeholders that the biodiversity compensation will deliver the result that was expected beforehand. Even though there are neither guarantees that biodiversity can be developed as planned nor assurances about the lifespan of the company, it is important to set conditions for the best possible outcome. This entails inter alia the formulation of monitoring and management plans and defining the period of time during which the compensation area is guarded against future negative impacts. Lessons can be learned from experiences with permanent carbon credits under the Clean Development Mechanism defined in the Kyoto Protocol[12].

12 http://cdm.unfccc.int/about/index.html

3.4.5 Stakeholder engagement and communication

The significance of the engagement of relevant stakeholders with the preparation and execution of compensation plans is generally acknowledged. This concerns stakeholders both in the impact as well as in the compensation areas. The concept of biodiversity compensation and any ideas (together with their likely impacts) need to be explored together. It is not feasible to set up a realistic compensation plan without stakeholders, let alone to implement it. Specifically as far as the degradation of ecosystem services and the effects of biodiversity impacts on day-to-day living conditions are being concerned, local people may come up with different ideas and solutions than anticipated by the impacting company. Moreover, linking up with stakeholders offers the opportunity to connect compensation efforts with existing biodiversity initiatives and goals. Finally, stakeholder engagement delivers insights in the different values attached to biodiversity by specific stakeholders. These insights are crucial in order to draw up a compensation plan that can count on sufficient support by stakeholders.

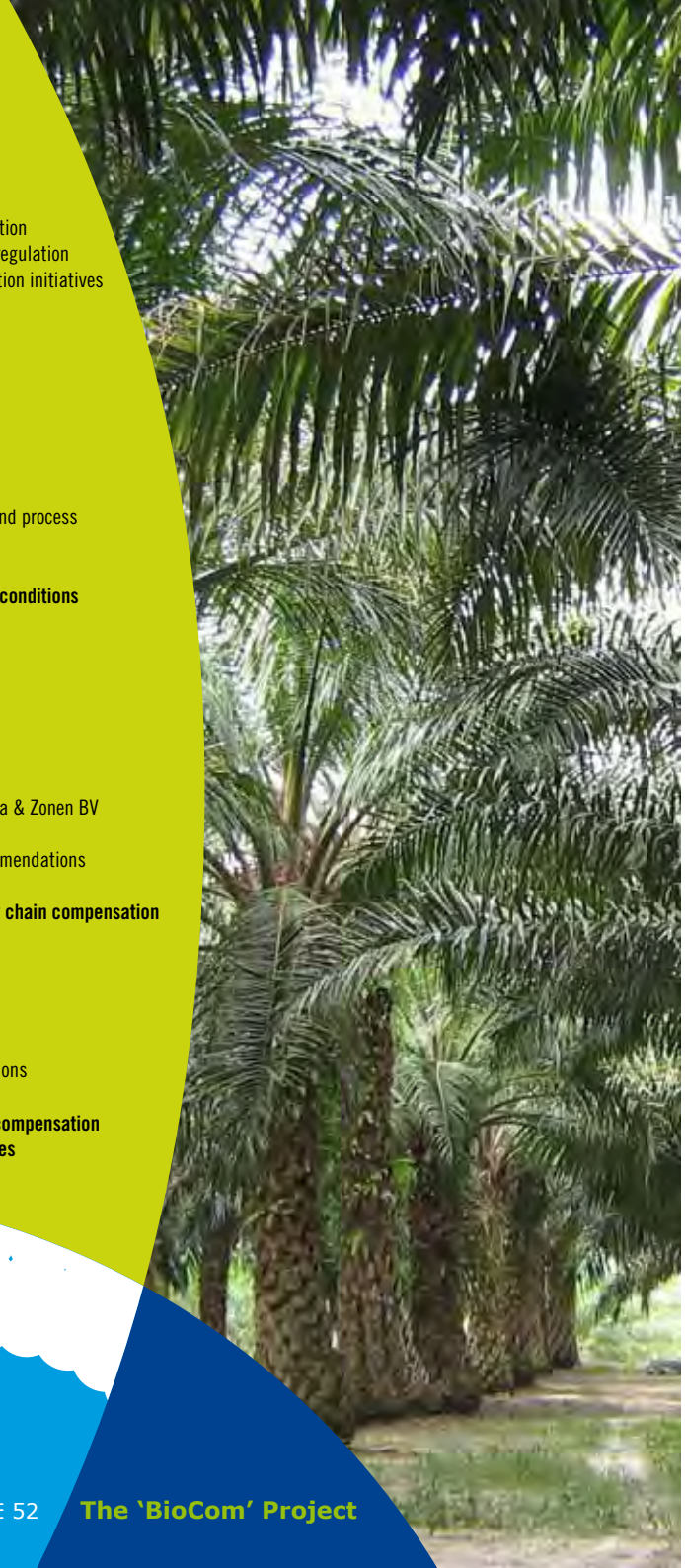
Communicating with stakeholder may be a time-consuming and complex process, especially when there is a wide variety of opinions and opinions are conflicting. Even more so, if we consider the fact that we are looking at supply chains within BioCom that may stretch to different countries all over the world. Process transparency and disclosure of information are essential for potential beneficiaries. The nature and frequency of engagement may vary, depending on the (pre-) compensation phase, support for ideas and the feasibility of compensation plans. A communication plan can be developed to streamline the intended engagement and communication with stakeholders (meetings, correspondence, company reporting, etc.).

Transparency is essential in communication. In this context it is about sharing knowledge and ensuring insights in the logic behind the decision to compensate and the shape that is given to compensation. It shows the involvement and responsibility of companies and their concern with respect to the production and origin of their products. The disclosure of relevant information on purpose, activities, scale and timelines of the compensation helps stakeholders to understand the risks, impacts and opportunities.

Part 4

Compensation Plans

COMPENSATING BIODIVERSITY LOSS



BioX Group BV

Compensation plan for the impacts on biodiversity in the biomass-based electricity supply chain

SUMMARY

4.1 BioX Group BV[13]

Description of the company

The BioX Group BV ("BioX"), a Dutch renewable energy company specialising in producing energy from liquid biomass, focuses on:

- Development and - in future- operation of bio-energy plants in Europe (50-100 MWe each)
  By the end of 2007, BioX had secured irrevocable permits for three Dutch plants and one Italian plant. Operations are expected to start in 2010. These bio-electricity plants intend to use palm oil or palm oil derived products as fuel (to be imported from South-East Asia).
- The development of CDM projects at palm oil mills in South-East Asia
  BioX has developed a technology, whereby wastewater ponds are converted into biogas reactors, with the biogas (methane) being captured and converted to electricity for local use. The avoided CO_2-emissions classify as Certified Emission Rights (CER) under the Kyoto protocol.

Selected activities for biodiversity compensation

The biodiversity compensation plan focused on the envisaged 50 MWe power plant near Vlissingen (The Netherlands) and its palm oil supply chain. Quantitatively, the chain encompasses the production, transport and use of 80,000 tons/annum of RSPO certified palm oil to produce renewable electricity in the Vlissingen power plant. This equals the annual capacity of the plant.

Resource use and discharges for the selected activities

The palm oil to bioelectricity chain can roughly be divided in three main parts:

1. Production of palm oil on a plantation in South-East Asia
2. Transport of palm oil from South-East Asia to Vlissingen
3. Production of electricity from palm oil in the Vlissingen power plant

The resource use and discharges of palm oil production, transport and electricity production have been qualified and quantified for the baseline situation (table 4.1, 2nd column, 'base case'). This baseline situation includes the taken standard mitigation measures.

Given that BioX' activities had not yet started, resource use and discharges have been calculated based on existing literature and data available for RSPO produced palm oil, mainstream transport of palm oil and the environmental permits issued for the bio-electricity plant. The base case has been used to identify Extra Mitigation measures (EMMs) (table 4.1, 4th column, 'EMMs'), an overview of which is given below.

Re 1: Palm oil production

In addition to measures required for RSPO certification (= base case), impacts of palm oil production on biodiversity could be further reduced by:

- *Wastewater treatment*
  BioX, through its subsidiary BioX Carbon, designs, implements and operates anaerobic waste water treatment facilities. It has been BioX' intention to implement such facility at the palm oil mill(s) from which it would contract palm oil.

- *Biological pest and herb control methods*
  There is evidence that the use of biological pest and herb control methods can significantly reduce the overall use of pesticides and herbicides on plantations, but it would be difficult for BioX to influence the basic agronomic policy and practices of the palm oil producer from which it will contract palm oil (lack of power in supply chain).

- *Use of more efficient machinery and trucks*
  Overall energy use at palm oil plantations and palm oil mills could well be reduced by using more energy efficient machinery and trucks. However, as substitution of current machinery will generally be part of a long term investment plan, it was not realistic to calculate any mitigation impact at this stage. It is something that BioX can put forward for discussion with the palm oil supplier.

13 At the time of writing, BioX Group BV has ceased to exist. The bio-energy plant in question has not been built.

- *More efficient use of solid organic residues*
  Various studies have looked into the feasibility of upgrading solid organic residues from the palm oil mills (empty fruit bunches, fibres) to products such as ethanol and fuel pellets. It is questionable whether the upgrading of solid organic residues has an environmental advantage over mulching and re-use of these materials as an organic fertiliser on the plantation ground (which is now common practice): every technology which removes organic material from the natural plantation cycle, will require additional dosing of fertilisers and, eventually, pesticides.

Re 2: Palm oil transport
Impacts of palm oil transport could be reduced by the use of cleaner fuel and/or more efficient transport means. However, BioX does not have any influence on this part of the supply chain. Pressure on the transport sector to limit CO_2 emissions should take place in a broader context.

Re 3: Electricity production
The technology proposed for the plant is 'Best Available Technology' under the European IPPC Directive. The Dutch environmental permit was issued on the basis of the application of this technology. As a result thereof, further emission reduction measures are not deemed realistic or cost-effective. In terms of electrical efficiency, the proposed technological concept of diesel engines combined with a steam turbine is amongst the highest in bio-electricity plants (approximately 50%).

Biodiversity footprint
The actual or net footprint of BioX is calculated based on the resource use and discharges, including the application of any extra mitigation measures.

A difference can be made between the annual biodiversity footprint and the footprint related to historical losses. The annual biodiversity footprint comprises of the biodiversity loss per year as a consequence of today's activities. The question how to compensate for historical biodiversity losses due to factors other than land take appeared impossible to answer within BioCom due to a lack of information. Consequently, the discussion was limited to historical losses following land conversion in the past that gave way to the current business activities.

The footprint of BioX has been calculated as follows (see tables 4.1, 4.2 and 4.3):

Land use
Land use impacts include land use in Malaysia (palm oil plantation) and in the Netherlands (energy plant).

Land use in Malaysia
The land requirement for producing 80,000 tons of Crude Palm Oil (CPO)/ annum equals 20,000 ha, based on an average CPO yield in Malaysia of 4 tons/ ha*annum. However, as CPO for the energy plant originates from a RSPO certified plantation, the land requirement should also include the RSPO requirement of 10% set aside land. This leads to a total land requirement of 22,000 ha.

Palm oil plantations produce CPO as main product, and Palm Kernel Oil (PKO) as by-product, both of which have economic value. In accordance with international approaches to Life Cycle Analyses, it was concluded that part of the biodiversity footprint of the plantation can be attributed to PKO. The ratio for attributing the biodiversity impact between CPO and PKO has been based on the ratio of yields per hectare, as this is a relatively constant factor (as opposed to the market values of CPO and PKO that could also have been taken, but they vary constantly). As PKO yield per hectare is approximately 20% of CPO yield, the net land use of CPO in this case is 80% * 22,000 ha equals 17,600 ha. Of this area, 80% of 2,000 ha is still assumed to be intact biodiversity-wise (= 1,600 ha).

For the biodiversity footprint, the MSA methodology has been used to assess the level of biodiversity change over the years in comparison with the naturally present biodiversity (see section 3.3.4). The palm oil plantation has been ascribed a residual MSA of 0.25 [14]. The biodiversity footprint thus is 0.75 x 16,000 ha (17,600 - 1,600) = 12,000 ha. This is a

14 Alkemade, R., van Oorschot, M., Miles, L., Nellemann, C., Bakkenes, M. en ten Brink, B. (2009) GLOBIO3: A Framework to Investigate Options for Reducing Global Terrestrial Biodiversity Loss. *Ecosystems* 12, 374-390.

historical loss, since the conversion from the original (natural) state to its current use took place in the past, before the 2005 cut-off point adopted by the RSPO.

Land use in the Netherlands
The land requirement for the bio-energy plant is between 0.5 and 1 ha, depending on the exact configuration and storage capacity deemed necessary (number of tanks). For calculation purposes, a land requirement of 1 ha has been used. The MSA of the land used is 0.1. The biodiversity footprint thus is 0.9 x 1 = 0.9 ha. This is a historical loss, since the land conversion took place in the past.

CO_2 (equivalent) emissions
There are two types of emissions which require attention: emissions resulting from (historic) land use change, and emissions from the supply chain activities.

Historical land use change - converting primary forest into a palm oil plantation – led to a significant decrease of carbon stocks, and consequently emission of CO_2. In accordance with international CO_2-calculation methodologies, the total loss in carbon stocks over 20,000 ha (7.16 million tons CO_2) has been discounted over a 20 year time period, leading to an annual emission factor of 358,000 tons CO_2). Also in this case, this quantity has been corrected for the fact that – in addition to CPO – PKO is produced on the converted land as well. Consequently, only 80% of the total carbon emissions have been allocated to the CPO used by BioX.

As far as the annual supply chain activities are concerned, CO_2 emissions will primarily occur during plantation activities (use of machinery) and transport (local and international). This totals 5,924 tons CO_2 for CPO production, which is a relatively small quantity compared to the CO_2 emitted as a result of land use change. Moreover, the energy plant emits large quantities of CO_2. However, this is referred to as a so-called short cycle CO_2, whereby the plant emissions are neutralized by the CO_2 uptake from the atmosphere during the growth of the oil palm fruits.

Water use
There is a lack of water footprint models or other general applicable methodologies to assess the impacts of water use on biodiversity. Within BioCom, water use pressure in the different parts of the supply chain has been assessed on the basis of global water stress models (see section 3.3.4).

As far as water use is concerned, it can be said that Malaysia and the Netherlands do not experience water stress [15]. Research on the ground to verify local water stress (in and around the production areas) has not been carried out.

Miscellaneous
The main impacts in the pressure group miscellaneous for the BioX supply chain result from the use of pesticides and herbicides, and the discharge of waste and cooling water (see table 4.2). Not only are the biodiversity effects difficult to establish, these impacts are also deemed very small compared to the biodiversity impact originating from land clearance to enable economic activities (especially the plantation estate).

The tables below give an overview of the most important inputs and outputs as well as the biodiversity footprint of BioX.

15 This information is based on expert advice and models from the Netherlands Environmental Assessment Agency.

Table 4.1: Biox Biodiversity footprint

Impact categories	**Resource use and discharge** **Base case**	**Annual biodiversity footprint** **Base case**	**Extra mitigation measures (EMMs)**	**Resource use and discharge** **+ implemented EMMs**	**Annual biodiversity footprint**	**Biodiversity footprint** **Historical loss**	**Remarks**
Land use							
Palm oil plantation Malaysia	17,600 ha	0 ha	Obtaining higher yields per ha	< 17,600 ha	0 ha	12,000 ha	
Energy plant, Netherlands	1 ha	0 ha	Efficient planning	< 1 ha	0 ha	0.9 ha	
CO_2 (equivalent) emissions							
Deforestation palm oil production area, Malaysia	16,000 ha	0 kg CO_2	Not applicable	16,000 ha	Not applicable	7,160,000,000 kg CO_2	
Machinery diesel, Malaysia	32,000 GJ	2,102,503 kg CO_2	Fuel-efficient machinery, biofuels	< 32,000 GJ	< 2,102,503 kg CO_2		Not applicable, activities have not been started yet
Palm oil mill activities, diesel, Malaysia	38,400 l	102,912 kg CO_2	Running the mill on biomass from the plantation	< 38,400 l	< 102,912 kg CO_2		As above
Liquid waste, palm oil plantation, Malaysia	1,184,000 (+ CH_4) m^3	384,000,000 kg CO_2	Waste treatment (capturing methane)	0	0		As above
Transport fuels, Malaysia	256,000 l	686,080 kg CO_2	Fuel-efficient trucks, biofuels	< 256,000 l	< 686,080 kg CO_2		As above
CPO transport Malaysia – Netherlands	42,000 GJ	3,033,333 kg CO_2	Fuel-efficient shipping, biofuels	< 42,000 GJ	< 3,033,333 kg CO_2		As above
Water use							
Drinking water, energy plant, Netherlands	2,000 m^3	None*	None, best available practice	2,000 m3	None*		Not applicable, activities have not been started yet
Industrial water, energy plant, Netherlands	10,000 m^3	None*	None, best available practice	10,000 m3	None*		As above
Cooling water, energy plant, Netherlands	28,8 million m^3	None*	None, best available practice	28,8 million m3	None*		As above

* See also table 4.2

Table 4.2: Biodiversity footprint Biox - miscellaneous

Resource use and discharge	**Biodiversity footprint Base case**	**Remarks**
Waste water, palm oil plantation, Malaysia	280,000 m^3 (BOD > 1000 mg/l)	BioX designs, implements and operates anaerobic waste water treatment facilities. It is BioX' intention to implement such facility at the palm oil mill(s) from which it contracts its palm oil. This facility would decrease the BOD value to < 50 mg/l.
Fertilizer use, palm oil plantation, Malaysia	4,148 ton	Application of Good Agricultural Practices and/or organic manuring would result in reduced use of chemical fertilizers, pesticides and herbicides. The MSA (applied to calculate the land use footprint) has been used to assess the current biodiversity status of the plantation. It takes into account the fact that the palm oil will be produced by way of intensive agricultural farming methods. In this way, this impact has at least slightly been covered in the footprint calculations.
Pesticide use, palm oil plantation, Malaysia	70 ton	As above
Herbicides use, palm oil plantation, Malaysia	7,2 ton	As above
Noise pollution, plantation , Malaysia	Unknown	A change of production methods could result in fewer decibels being produced at the plantation. Noise can result in disturbance for animals in an area larger than the production area itself. Formulas exist to calculate the magnitude of such area using a 45dBa contour. It depends on the local environment: are there trees or buildings that hinder the wider dissemination of the noise? Local knowledge is necessary to enable application of such formula.
Flue gas, palm oil mill	Unknown	There are no methodologies to express this impact in a biodiversity footprint.
Waste water, energy plant, Netherlands	2,000 m^3	The methodology used is the best available practice and accepted according to the environmental permit. The impact on biodiversity will be minimal as the water will be purified by a water station before being discharged.
Waste water, energy plant, Netherlands	10,000 m^3 (min.oil<10 mg/l, org.mag.<50 mg/l, PH 6,5-9)	The methodology used is the best available practice and accepted according to the environmental permit. The emissions are of levels that are expected to give minimum impacts on biodiversity.
Used cooling water, energy plant, Netherlands	28,800,000 m^3	The methodology used is the best available practice and accepted according to the environmental permit. The temperature of the sea water could slightly rise as a result of the discharged cooling water. The expected impacts on biodiversity as a result thereof are minimal.

Table 4.3: Accumulated biodiversity footprint BioX

Impact categories	**Annual biodiversity footprint** **Base case**	**Annual biodiversity footprint** **Based on implemented EMMs**	**One-time biodiversity footprint due to** **Historical loss**
Land Malaysia	0 ha	0 ha	12,000 ha
Land Netherlands	0 ha	0 ha	0.9 ha
CO_2	389,924,828 kg CO_2	< 5,924,828 kg CO_2	7,160,000,000 kg CO_2
Water Netherlands	None	None	Not applicable

Biodiversity compensation plan

BioX has specified compensation projects for the production of palm oil in Malaysia as well as the bio-electricity plant in Vlissingen. A compensation project for the transport of feedstock was not specified, as the overall footprint of the transport component is limited compared to the production components (palm oil production and energy plant).

Compensation proposal for palm oil production in Malaysia

Several options were identified for compensating the biodiversity footprint (land use and CO_2 (equivalent) emissions) of palm oil production in Malaysia:

1. *The Global Peatland Fund*: Initiated by Wetlands International, BioX and several other partner organizations, this fund will generate resources for the restoration of degraded peatlands and the maintenance of pristine peat swamp forest habitat. Projects implemented under the fund (with an initial focus on Kalimantan) will generate carbon credits (VERs) from avoided CO_2 emissions and will contribute significantly to biodiversity conservation through protection and restoration measures. (http://www.wetlands.org/Whatwedo/PeatlandsandCO2emissions/tabid/837/Default.aspx)

2. *The Heart of Borneo campaign:* This program, implemented under the lead of WWF, aims to safeguard remaining highland forest in the centre of Borneo from logging, land conversion for plantation development and other degrading practices such as pollution and poaching. The heart of Borneo campaign is implemented in close cooperation with local private sector stakeholders, regional government and local NGOs. (http://wwf.panda.org/what_we_do/where_we_work/borneo_forests/)

3. *WWF REDD pilot initiatives (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries) in Indonesia:* WWF currently investigates options for REDD development in several regions in Indonesia including Riau (Sumatra) and Papua. Practical conservation measures have not yet been implemented. (http://redd-indonesia.org/en/about-us/)

4. *The Malua BioBank:* initiated by a group of investment bankers, this project aims to sell 'biodiversity conservation certificates' for the purpose of the restoration and conservation of a formal logging concession area on Sabah, Malaysia. (http://www.maluabank.com/index.htm)

5. *The Corridor of Life (CoL) program:* implemented by WWF, this program aims to conserve alluvial lowland forest along the Kinabatangan River on Sabah, Malaysia. Through an integrated approach, engaging local communities and private sector in the development of management plans and conservation and restoration measures, the program tries to maintain the ecological values of the area. (http://www.wwf.org.my/about_wwf/what_we_do/forests_main/kinabatangan___corridor_of_life/)

The Global Peatland Fund and WWF's REDD initiatives currently are in a too preliminary stage to be incorporated in the BioX compensation plan. However, considering the objectives of biodiversity conservation as well as climate mitigation, these initiatives might provide considerable compensation opportunities in the future.

The Malua BioBank project was potentially of significant interest. Expected benefits of the project have been quantified and rigorous monitoring frameworks seem to be in place. However, as this initiative specifically states that it does not accept compensation payments, the Malua BioBank has not been further considered.

The Heart of Borneo campaign has largely adopted a programmatic approach. This means that individual contributions are used to cover a larger portfolio of activities. As a result, the impacts of individual investments can not be sufficiently quantified. This renders the project unsuitable for compensation investments in the view of BioX.

The CoL program was considered the best available option for compensating the biodiversity impacts in Malaysia. The project is considered of particular interest for the following reasons:

- It is likely that the envisaged palm oil supplier for the Vlissingen bio-energy plant will have its core activities in Sabah. This provides a clear link of relative proximity between the palm oil production site and the compensation site.
- The CoL protects the same habitat that has been converted for the benefit of establishing many palm oil plantations.
- The CoL has been an existing program since 1990, and consequently is well established with various concrete projects either operational or planned by others.
- CoL offers various compensation opportunities, ranging from conserving existing habitat (thus avoiding deforestation) and reforestation for the protection of endangered species. Various projects within the CoL program, in particular those focusing on reforestation and avoiding deforestation, combine compensation possibilities for the footprint categories of land uptake and carbon emissions.
- Various stakeholders including local palm oil companies are closely participating in CoL implementation.
- Relatively strong local governance structures as well as cooperation with local governments are in place.
- CoL has identified a distinct set of project activities in different, separately delineated project areas. This facilitates quantification of results accomplished under a compensation project.
- The CoL program actively seeks to promote co-existence of nature conservation and agricultural activities, in particular palm oil plantations.

The extent to which the annual and historical biodiversity footprint of the BioX supply chain (see table 4.3) can be compensated within the CoL program would be determined by the budget made available for this purpose by BioX. At the time of writing the compensation plan it had not been possible for WWF to provide detailed calculations on the acreage that could be contributed by an indicative annual BioX budget of 1 million Euro. However, it seems unlikely that with a 1 million Euro/annum budget, full compensation of historical land use change (through restoration/conservation of land and CO_2 sequestration) could be achieved in a 10 year period.

Compensation proposal for the biodiversity impacts of the energy plant in Vlissingen

The objective is to develop a project with an acreage that covers the land uptake of the power plant (< 1ha), plus a correction factor (3-5) to compensate for other emissions and discharges (to air and water). Hence, indicatively, a project to take care of an area between 3-5 ha is envisaged. It is to be emphasized that the correction factor is an educated guess made within BioCom, given the fact that it did not appear possible to objectively calculate a one-dimensional unit for all types of emissions and discharges from the energy plant.

BioX aims at cooperation with Natuurmonumenten in the province of Zeeland for this compensation project. This NGO is involved in maintaining and restoring local landscapes and ecosystems.

Implementation plan for biodiversity compensation

Operations for the energy plant in Vlissingen were expected to start in 2010. Given negotiations with a potential new shareholder and pending investment decisions, however, made it necessary to make some shifts in the planning. The start of the biodiversity compensation (contributions) was planned once the plant would become operational, as this is the moment when the biodiversity footprint along the biomass to electricity chain becomes apparent. A number of activities have to be undertaken and decisions made beforehand. A planning will be made upon commencement of the construction of the energy plant. Moreover, it is essential that (local) stakeholders will be consulted at that stage, for which a communication and engagement program will be developed.

Observations

Some observations relating to the specific characteristics of the BioX case are:

• *Supply chain responsibility*

BioX stated from the beginning that it intends to take responsibility for supply chain biodiversity impacts but did differentiate between :

1. Annual, ongoing impacts of activities owned and operated by BioX (highest priority of responsibility).
2. Annual, ongoing impacts of activities further down the supply chain not owned and operated by BioX (second category of priority).
3. Historical impacts of activities owned and operated by BioX, i.e. land use change at the power plant location (no direct responsibility).
4. Historical impacts of activities further down the supply chain, i.e. land use change at the palm oil production location (no direct responsibility).

The way BioX finally dealt with supply chain responsibility was co-determined by stakeholders (see 'stakeholders' vision' bullet). The fact that historical impacts are substantial compared to the annual impacts played an important role in that discussion (see 'historical versus annual impacts on biodiversity' bullet).

• *Historical versus annual impacts on biodiversity*

BioX' first priority has been to compensate for the annual impacts on biodiversity it would cause through operating the plant. This was based on the fact that land use changes and resulting adverse impacts took place prior to BioX' existence. However, this idea proved difficult to put into operation as there appeared to be a difference between annual, ongoing biodiversity impacts of a palm oil to electricity supply chain on the one side and related historical impacts on the other: the historical impacts on biodiversity are huge due to land conversion (loss of natural area and release of carbon stock) while the annual impacts are nil in comparison. Stakeholders therefore tried to convince BioX to focus on the historical losses.

• *Stakeholders' vision*

BioX' stakeholders had different visions on the moral responsibility the company should have towards compensation of historical impacts of activities. Various stakeholders would like BioX to take full responsibility for, in particular, the impacts caused by historical land use changesat the palm oil plantation. A key argument included the fact that the continued activities of BioX prevent the land to return to its original natural state. Discussions between the BioCom participants also concerned the question whether or not full historical loss should be taken into account or a cut-off point would make more sense. BioX wished to stick to the cut-off point applied by RSPO (November 2005) to remain in line with sector behaviour and agreements. Given the highly emotional debate on palm oil sustainability and (historical) land use change, and the fact that at the end of the day the BioX compensation plan will need to be supported by stakeholders (including NGOs), BioX agreed to consider compensating part of the historical land use change.

• *Determination of footprint*

Many products coming from the field serve different industries. So is the case with palm oil. Oil palm fruits deliver CPO and PKO. It was agreed within BioCom that part of the supply chain impacts could be allocated to PKO and would therefore not be for the account of the BioX supply chain.

• *Budget*

In the palm oil sector the RSPO is considered to provide the sustainability standard. BioX has shown willingness to go beyond such sustainability by looking into the possibilities for biodiversity compensation, since RSPO certified palm oil does not attain 'no net biodiversity loss'. However, BioX works in a commercial environment in which its consumers hardly pay extra for RSPO certified output. Financial restrictions force a priority setting. Priority has been given in the compensation projects to what is creating the main biodiversity loss in the supply chain: historical land use change. As the costs involved in implementing any compensation plan need to be affordable in light of the company's business model, it is highly probable that not all (historical) supply chain impacts can be borne by BioX solely. This was deemed realistic by the stakeholders consulted. An option could be, at a later stage, to discuss the topic of compensation with supply chain partners

to see to which extent they are willing to share in the costs.

• *Compensation format*
Local circumstances – complicated rights of ownership, low level local governance, local language and rituals – can make it very difficult to start the implementation of a compensation plan. A more attractive option could then be to link up with existing projects. It was for this reason that BioX started looking into options as the Corridor of Life. It was foreseen that it would be difficult for a Dutch organization to set up a compensation project in Southeast Asia on its own. The Corridor of Life project has a proven track record showing positive benefits for the local population and biodiversity (e.g. through regeneration of degraded forest and seeking for alternative livelihoods for local communities). The compensation coincides with either situation 2 or 3 in figure 3.1 (section 3.2.2).
Another aspect surfaced in the discussion that appeared very important for activities that are linked to significant land conversion (from a natural to a production status) due to palm oil production. Conversion not only destroys the present habitat but results in the release of abundant carbon emissions. This is specifically the case when peat forests have been or still are being converted.

• *Compensation efforts*
It was questioned whether it would be accepted by stakeholders to combine the compensation of land use *(e.g. replanting areas and thus creating uptake of CO_2; maintenance of existing biodiversity-rich areas that are carbon stocks)* and CO_2 emissions in one project. This needs to be further dealt with during local stakeholder consultation when the biodiversity compensation plan will be finalized and implemented.

COMPENSATING BIODIVERSITY LOSS

Koninklijke Houthandel G. Wijma & Zonen BV

Compensation plan for the impacts on biodiversity in the timber supply chain of Swiss Lumber Company Ltd.

SUMMARY

4.2 Koninklijke Houthandel G. Wijma & Zonen BV

Description of the company

Koninklijke Houthandel G. Wijma & Zonen BV (Wijma) is an international tropical timber trading company active in the entire supply chain, from the management and exploitation of tropical forests up to and including the sale of hardwood and hardwood products to buyers all around the world. The activities of Wijma cover three production facilities in the Western African countries Cameroon, Ghana and Ivory Coast, linked to which are four trading companies located in the Netherlands, Germany, United Kingdom and France. Apart from this, Wijma has a purchasing company in Brazil and a specialized timber trade for trailer constructions in the Netherlands.
Wijma has a unique place in the wood industry as it is active in the entire supply chain from forests up to final products. As a result, the company has been able to initiate at an early stage several projects against deforestation and in favour of the promotion of sustainable forest management.

Selected activities for biodiversity compensation

Wijma has selected the entire supply chain of Swiss Lumber Company Ltd. (SLC) in Ghana for BioCom. This company both exploits forests and owns a saw mill. The forest activities of SLC can be divided into two main parts. On the one side, SLC exploits its Bura River Forest Reserve concession (the southern part); on the other hand, SLC exploits compartments of other concessionaires as a contractor. SLC transports wood which it processes in its saw mill in Manso Amefi (Wasa Amenfi West district). Apart from the wood derived from the Bura River Forest Reserve concession and the compartments of partners, the saw mill also processes wood from third parties. The division is as follows: 13% Bura River Forest Reserve, 77% exploitation in cooperation with partners and 10% third party purchase.

On an average, 47% of sawn product is sawn from roundwood; the remaining 53% consists of sawdust (25%), fine timber waste (15%) and coarse timber waste (60%). Charcoal is being made from the timber waste by way of a highly efficient carbonizing process. The sawdust is being used as an energy source for a water heater, with which a set of four drying rooms is being heated. All softwoods (Wawa, Ofram & Koto) are being treated with a preservative before the timber is being transported by truck to the harbour in Takoradi. From Takoradi, the timber is being transported by sea freight to Europe.

Resource use and discharges for the selected activities

Assessing the biodiversity impacts of all SLC activities appeared quite complicated since the wood processed by the SLC saw mill comes from a large number of different resources. Therefore, it was decided to use the available quantitative data concerning the SLC forest exploitation of its concession in the Bura River Forest Reserve (13% of the total timber production) as an indicator for the total production of the SLC saw mill in Ghana.

The resource use and discharges of SLC have been qualified and quantified for the baseline situation (table 4.4, 2nd column, 'base case'). This baseline situation includes mitigation measures currently being taken. On top of the base case, Extra Mitigation measures (EMMs) have been identified (table 4.4, 4th column, 'EMMs'), an overview of which is given below:

Land use
Land use in Ghana could in theory be reduced by lowering the yield, for example by not logging in particular compartments assigned. From a legal point of view, however, this is not allowed in Ghana. The concessionaire is obliged to harvest the area agreed upon within a certain timeframe.

Forest management
Forest management could possibly be improved through a forest certification system like the Forest Stewardship

Council (FSC). In practice this is not feasible though, given the fact that the government is the party responsible for the forest management. Moreover, such a certification would only be viable from a commercial point of view when the buyers would be willing to pay extra for certified timber, which is hardly the case.

Transport
As yet, it does not seem realistic for Wijma to believe that they can move the transport sector in order to shift to more energy efficient transport means (different engines for trucks/sea vessels) or to biofuels. Wijma's influence on this sector is too small an accomplishment for such a shift.

Power plant
A project team within Wijma currently assesses the possibility of placing a power plant of its own next to the saw mill operated in Cameroon. Rather than producing charcoal, energy would be generated out of timber waste and sawdust. The energy generated would at least be sufficient to meet own demands. This diminishes the footprint since:

- energy used to produce charcoal will be avoided;
- there will be no transport of charcoal;
- the flows of timber waste will be reduced to zero.

Should the placement of a power plant turn out well in Cameroon, this concept could also be applied in Ghana in the future.

Biodiversity footprint

The footprint of Wijma is calculated in a way that is based on the resource use and discharges with respect to the activities in the Bura River Forest Reserve (13% of the total timber production), including the application of any extra mitigation measures, and then extrapolated to the total production of the SLC saw mill.

A difference can be made between the annual biodiversity footprint and the footprint related to historical losses. The annual biodiversity footprint comprises of the biodiversity loss per year as a consequence of today's activities. The question of how to compensate for historical biodiversity losses due to factors other than land take appeared impossible to answer within BioCom due to a lack of information. Consequently, the discussion was limited to historical losses following land conversion in the past that gave way to the current business activities.

The footprint of Wijma has been calculated as follows (see tables 4.4, 4.5 and 4.6).

Land use

Land use concerns the Bura River Forest Reserve production area in Ghana and the saw mill area in Ghana, the biodiversity footprint of which is reflected in table 4.4. To calculate the biodiversity footprint, the MSA methodology has been used to assess the level of biodiversity change over the years in comparison with the naturally present biodiversity (see section 3.3.4).

The compartment under concession in the Bura River Forest Reserve is 730 ha. According to the MSA index, extensive wood logging has been ascribed a residual MSA of 0.8 before logging and an MSA of 0.5 after logging[16]. Points of departure for such an MSA are:

- It concerns a logging area where the natural biodiversity once started with 1. When Wijma started economic activities in this region, it was already a logged and partly regenerated area. Given the continuing logging, it is assumed that it cannot attain the 1 again, but only comes back to 0.8 before logging starts again.
- The interval between consecutive logging operations is long enough (40 years) for the forest to recover to the point of departure (MSA = 0.8).

The above means that the historical footprint is 0.2 x 730 ha = 146 ha. The annual biodiversity footprint differs per year, which is explained below based on figure 4.1.

16 Alkemade, R., van Oorschot, M., Miles, L., Nellemann, C., Bakkenes, M. en ten Brink, B. (2009) GLOBIO3: A Framework to Investigate Options for Reducing Global Terrestrial Biodiversity Loss. Ecosystems 12, 374-390.

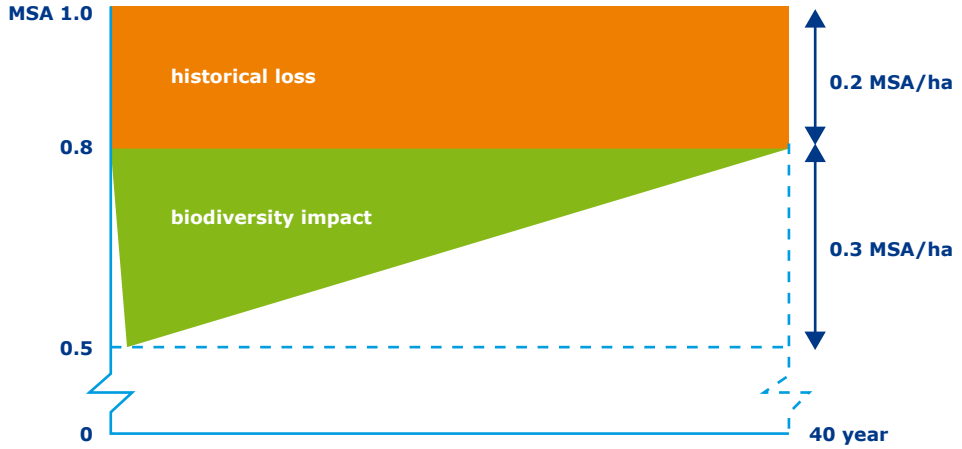


Figure 4.1: The biodiversity footprint of SLC, Ghana, based on a 40 year rotation cycle

Figure 4.1 shows the course of the biodiversity impact of SLC's forest exploitation (selective, cyclic logging). In Ghana, sustainable forest management entails that logging takes place once every 40 years in a particular region. Upon logging, which causes a substantial negative impact on biodiversity, the forest has a period of 39 years to recover from MSA = 0.5 to MSA = 0.8. The impact on biodiversity due to the logging activities in question is assumed to reduce to nil upon expiry of this period (without taking into account the historical losses). Compensation inversely proportional to such gradual recovery is needed, which would mean that compensation is less and less required throughout the recovery phase. However, for SLC, there is a continuous substantial impact given the fact that the logging is performed annually throughout the whole forest; so every year, another part of the forest experiences the first-year high impact. For the forest as a whole the mean compensation for the whole rotation cycle can be applied.

Annually, SLC needs an average number of 5,615 hectares for logging activities in order to provide the saw mill with sufficient input for production. To compensate for the annual land use biodiversity footprint, an equal number of 5,615 hectares should be upgraded with 0.3 MSA in 40 years' time. Only 1,685 ha are needed for compensation if the MSA would be improved from 0 to 1 in this area. An extra 0.2 x 5,615 ha compensation will cover for the historical loss.

CO_2 (equivalent) emissions

In the selected supply chain, CO_2 emissions mainly occur:

1. through the use of fossil fuels for machinery and equipment;
2. through the use of fossil fuels for transport;
3. through energy use for the purpose of charcoal production;
4. as a result of logging.

Table 4.4 shows that the first three types of emissions have almost completely been mapped for SLC's production chain. The fourth type of emission requires an expertise that was not available within the project team. CO_2 emissions are being released as a result of the logging, because not all timber cut is being 'preserved'. A part of the CO_2 captured in trees is maintained in the timber, but losses occur as well due to:

- the timber cut partly being burned for the purpose of charcoal production;
- the occurrence of natural decomposition of waste wood in the forest (e.g., bark, the top).

Also, a CO_2-flux takes place as a result of the logging, due to the soil being exposed to light. The conversion of the humus soil (growth) causes a CO_2 discharge because of decomposition occurring (the soil will mineralize). Apart from that, CO_2 will be captured upon logging as the forest will start growing again. The amount of CO_2 being captured depends upon the forest-specific recovery curve. The speed of capturing will in any way decrease over the years (from a young to a mature forest) until a certain maximum of CO_2 will be captured.

An expert is needed to precisely map the CO_2 flows and translate the same to concrete numbers

Water use

Water footprint models or other general applicable methodologies to assess the impacts of water use on biodiversity are lacking. Within BioCom, water use pressure in the different parts of the supply chain has been assessed on the basis of global water stress models (see section 3.3.4).

As far as water use is concerned, it can be said that Ghana does not experience water stress[17]. Research on the ground to verify local water stress (in and around the production areas) has not been carried out.

Miscellaneous

The main impacts in the pressure group miscellaneous for SLC result from the use of oil (for motorized equipment) and disturbance of biodiversity due to the forest activities (noise, vibrations, etc.) (see table 4.5). Their biodiversity impacts are difficult to establish. At this point, these impacts can best be reduced by implementing mitigation measures.

17 This information is based on expert advice and models from the Netherlands Environmental Assessment Agency.

The tables below give an overview of the most important inputs and outputs as well as the biodiversity footprint of the Bura River Forest Reserve exploitation by SLC in 2007 (including extrapolation to the total production capacity of SLC).

Table 4.4: SLC Biodiversity footprint

Impact categories	**Resource use and discharge** **Base case**	**Annual biodiversity footprint** **Base case**	**Extra mitigation measures (EMMs)**	**Resource use and discharge** **+ implemented EMMs**	**Annual biodiversity footprint**	**Biodiversity footprint** **Historical loss**	**Remarks**
Land use							
Bura River Forest Reserve, Ghana	730 ha	219 ha	Reduce the harvesting pressure, FSC certification	< 730 ha	< 219 ha	146 ha	
Saw mill production area, Ghana	7 ha	0 ha	None	< 7 ha	0 ha	6.7 ha	
CO_2 (equivalent) emissions							
Diesel caterpillar, construction of forest roads, Ghana	Unknown	Unknown	Energy-saving equipment (e.g. different engine), biodiesel	Unknown	Unknown		Historical CO_2 emissions not taken into account
Diesel logging/timber transport out of the forest, Ghana	35,879 l	96,156 kg CO_2	More efficient/ energy-saving machinery, (e.g. different engine), biodiesel	<35,879 l	<96,156 kg CO_2		Idem
Diesel transport of trunks to saw milll, Ghana	14,485 l	38,820 kg CO_2	Energy-saving trucks (e.g. different engine), biodiesel	<14,485 l	<38, 820 kg CO_2		Idem
Diesel generator at saw mill, Ghana	23,006 l	61,656 kg CO_2	Own power station using waste wood	<23,006 l	<61,656 kg CO_2		Idem
Diesel transport of planks sawn from the saw mill to the harbour, Ghana	15,360 l	41,156 kg CO_2	Energy-saving trucks (e.g. different engine), biodiesel	<15,360 l	<41,156 kg CO_2		Idem
Diesel transport of planks sawn Ghana-Netherlands		34,210 kg CO_2	Energy-saving ships (e.g. different engine), biodiesel		<34,210 kg CO_2		Idem
Diesel transport of planks sawn Amsterdam-Kampen		6,240 kg CO_2	Energy-saving trucks (e.g. different engine), biodiesel		<6,240 kg CO_2		Idem

Table 4.4: SLC Biodiversity footprint

Impact categories	**Resource use and discharge** **Base case**	**Annual biodiversity footprint** **Base case**	**Extra mitigation measures (EMMs)**	**Resource use and discharge** **+ implemented EMMs**	**Annual biodiversity footprint**	**Biodiversity footprint** **Historical loss**	**Remarks**
Diesel, production of charcoal, Ghana	25,500 l	68,340 kg CO_2	Own power station using waste wood	<25,500 l	<68,340 kg CO_2		Historical CO_2 emissions not taken into account
Diesel, transport of charcoal from saw mill to harbour, Ghana	4,080 l	10,934 kg CO_2	Energy-saving trucks (e.g. different engine), biodiesel	<4,080 l	<10,934 kg CO_2		Idem
Diesel, transport of charcoal Ghana-Netherlands	Unknown	Unknown	Energy-saving ships (e.g. different engine), biodiesel	Unknown	Unknown		Idem
Diesel, transport of charcoal Amsterdam-Almelo	Unknown	Unknown	Energy-saving trucks (e.g. different engine), biodiesel	Unknown	Unknown		Idem
Water use							
Water for dipping, Ghana	2,000 m^3	None	Change in production method	2,000 m3	None		Historical water stress not taken into account

Table 4.5: Biodiversity footprint SLC - miscellaneous

Resource use and discharge	**Biodiversity footprint Base case**	**Remarks**
Dripping of motor oil, Ghana	Unknown	As yet, SLC has not managed to adjust the sawing process to such an extent that leakage of oil is avoided. The use of vegetable oil instead of fossil oil would in principle reduce the biodiversity footprint, though the sawing equipment does not run well on vegetable oil.
Heat, moisture, light, noise, vibrations, residual saw dust due to activities, Ghana	Unknown	Mitigating measures (adjustment of production methods) help to reduce / avoid a negative biodiversity footprint.
Waste wood in forest, Ghana	Unknown	Removing the waste wood could be an option, though the remainders also have a function for some animal species (offering a place to hide, for example).
Emissions (apart from CO_2) electricity, diesel, production processes, Ghana	Unknown	A change in production methods helps to reduce the biodiversity footprint, for example by applying energy-saving measures or the use of green energy.

Table 4.6: Accumulated biodiversity footprint SLC

Impact categories	**Annual biodiversity footprint** **Base case**	**Annual biodiversity footprint** **Based on implemented EMMs**	**One-time biodiversity footprint due to** **Historical loss**
Land use Ghana Bura River Forest Reserve + saw mill	219 ha	<219 ha	152.7 ha
Land use – extrapolation to total of SLC production chain	1,685 ha	<1,685 ha	1,129.8 ha
CO_2	>357,512 kg CO_2	reduced emission kg CO_2	Not taken into account
CO_2– extrapolation to total of SLC production chain	>2,750,092.3 kg CO_2	reduced emission kg CO_2	Not taken into account
Water Ghana	None	None	Not taken into account

Biodiversity compensation plan

Wijma's objective is to compensate for its net biodiversity footprint in Ghana. A first focus has been given to the compensation of (historical) land use. Two compensation options have been considered for SLC: establishing forest plantations and creating a trust fund to support protected areas. Upon final selection of the compensation activities, it can be investigated to which extent CO_2 sequestration can also be addressed in the chosen compensation.

1. Establishing forest plantations

SLC already manages a small surface area of plantations. Degraded agricultural land – in the vicinity of the saw mill – is being planted with indigenous tree species in cooperation with local farmers. The farmers are involved in the management of the plantations and, as such, change from farmer into forest manager. SCL coordinates the management, pays for the management and has the first right to purchase the trees from the owners when they are ready for felling. The pressure exerted on the forest reserves in Ghana makes the investment in the securing of timber supply in the longer term a good deal for SLC.

This generates a profit at three levels:

- The biodiversity value of the degraded farm lands increases considerably;
- The voluntary participation of farmers indicates that it is an attractive alternative for them;
- SLC secures its future supply of timber.

Compensation could take place by laying out more plantations in degraded areas, making use of a mixture of indigenous tree species. This delivers a positive biodiversity gain in relation to the degraded status of the land, and also has a positive effect on the provision of ecosystem services, such as freshwater (supply) and climate regulation. The biodiversity value of the compensation through plantations can even be increased by paying specific/strategic attention to biodiversity when laying out the plantations. Plantations could, for example, serve as a buffer for or corridor between forest reserves; the biodiversity gain of a compensation plan will as such be larger than just the gains created in the compensation area, because neighbouring areas also benefit from the corridor or buffer offered by the compensation area. This compensation coincides with situation 2B in figure 3.1 (section 3.2.2).

2. Supporting protected areas

An alternative compensation option could be the financial support for conservation and management of protected areas in Ghana. Different options could be identified, for example:

1. supporting a specific protected area through the Ghana Park Service (coincides with situation 3 or 4 in figure 3.1 (section 3.2.2));
2. supporting the restoration of areas in or around protected areas in cooperation with the Ghana Park Services; apart from buffer zones, connecting corridors might be interesting options (coincides with situation 2 or 3 in figure 3.1);
3. investing in the development of new protected areas in Ghana (coincides with situation 3 or 4 in figure 3.1).

Demonstrating additionality especially deserves attention when choosing the first option: what is the added value or biodiversity gain of the compensation? In practice, this compensation offer will differ from the laying out of plantations because:

- the direct influence of SLC on the execution and the results are smaller;
- apart from restoration only, conservation of existing biodiversity is also being considered. This means that additionality in relation to a future situation (level of threat) will play a role.

Pressures exerted on forest reserves and protected areas are increasing in Ghana. The system of forest reserves is being maintained on paper, but seems subject to growing erosion in practice. The two most important reasons for this are agriculture and illegal logging from the reserves. The conservation of existing areas that are important for biodiversity and ecosystem services – also as far as size is concerned – seems crucial in Ghana (apart from the restoration of

degraded areas). Strategically supporting protected areas or the creation of new protected areas through, for example, corridors or buffer zones can also in this case create an added value to the compensation. On first inquiry, it appeared that the support of protected areas through private funding is possible in Ghana to compensate for SLC's land take. This will need to be further looked into when making the compensation plan more concrete.

Implementation plan for biodiversity compensation

No implementation plan was incorporated in Wijma's compensation plan. Although the project results are being recognized by the management, Wijma felt that more research needed to be undertaken before the compensation plan could be implemented. Unfortunately, the finalization of the compensation plan coincided with a collapse in timber demand (the start of the economic recession). At the time of writing of the present compensation plan, no specific means could be allocated to the compensation of negative impacts on biodiversity as a result of business activities. However, thanks to the project, biodiversity will receive more attention within the sustainability policy of Wijma and within (sustainability) activities undertaken.

Observations

Some observations relating to the specific characteristics of the SLC case are:

• *Extrapolation*
The collecting of data to map the impacts of all activities of SLC turned out to be a very time-consuming and thus very costly exercise. It was then decided to take the data of their own exploitation in the Bura River Forest Reserve as a point of departure. These data have thereupon been extrapolated to the total saw mill production. As such, the biodiversity impact of the timber processed – bought elsewhere, but processed in the company owned saw mill – has been stipulated on the basis of a proxy. This enabled Wijma to assess the total biodiversity impact of SLC. However it is worth mentioning that the proxy has been based on the responsible forest exploitation applied by SLC in the Bura River Forest Reserve. It is not sure that all timber processed by SLC has indeed been felled in a sustainable manner.

• *Sticking close to own activities: forest exploitation*
The objective of this project has been to compensate for the impact on biodiversity that comes from the timber production and processing of SLC in Ghana. Apart from this main objective, the organization of the compensation also took into account the possible connection to Wijma's activities in Ghana. Wijma has a preference for compensation options in which forests are at the centre: afforestation or forest restoration to support protected areas. This means that the first compensation option described above, 'establishing forest plantations', is the preferred one. Also, Wijma would like to translate 'sticking close to own activities' into compensation activities taking place in the same ecological zone in Ghana as the one in which SLC currently undertakes its activities.
Wijma does see a risk in this form of compensation, namely with respect to a credible communication on the compensation project. The pitfall is that the laying out offorest plantations, for example, not only serves biodiversity, but could also be regarded a business case for Wijma. Although the BioCom group did not have any objections beforehand to compensation from which both biodiversity and the company can profit, the feeling was shared that good communication to third parties is especially important in this case.

• *Availability of compensation area*
The assurance that biodiversity gains will actually be achieved is an important point of interest for Wijma. To accomplish this, Wijma would like to be substantially involved with the implementation of the compensation and carefully undertake the engagement of local stakeholders in Ghana (especially local populations, public authorities and nature conservation organizations). The laying out of plantations best anticipates the involvement wished for and also harmonizes with the observation mentioned above. On first inquiry in Ghana, however, it turned out that the availability of suitable areas that could be used for this type of compensation is very limited.

COMPENSATING BIODIVERSITY LOSS

Kruidenier Groep

Compensation plan for the impacts on biodiversity in the beef supply chain

SUMMARY

4.3 Kruidenier Groep

Description of the company

The Kruidenier Groep, a family business, is a national foodservices supplier of fresh and frozen food products, non-perishables and non-food products. The Kruidenier Groep offers a full package of services and a selection of over 40,000 products to its customers. Customers include catering organizations, restaurants, social service institutions, retail organizations, petrol stations, businesses and public authorities. The Kruidenier Groep is generally not visible to end-users, as the company does not directly deliver to the consumer. The company has a number of production companies and a very extensive distribution network at its disposal. Products are being delivered throughout the Netherlands from twelve distribution centers and four collection centers.

By nature and from conviction, the Kruidenier Groep is very active in the field of sustainability and organic produce. The company endorses existing sustainability criteria and invests in organic, eco-labeled and fair-trade products.

Selected activities for biodiversity compensation

The Kruidenier Groep decided to participate in BioCom as this is connected to in-company policy focus and societal developments. The beef supply chain was chosen to focus on the compensation effort. Not only are the quality and taste of beef becoming increasingly important, interest of customers in sustainable meat and meat products is growing as well. Moreover, more and more questions are being posed with respect to the impact of beef production on biodiversity due to the use of soy in feed production and the emission of methane by cattle.

Resource use and discharges for the selected activities

The resource use and discharges in the beef supply chain of the Kruidenier Groep have been qualified and, where possible, quantified for the baseline situation (table 4.7, 2nd column, 'base case'). It concerns the purchasing of Austrian beef in 2007; calculated into the number of animals, 3,400 slaughtered cattle per year are needed to comply with the demand of the Kruidenier Groep. The Austrian beef covers approximately 80% of the total volume of beef purchased by the Kruidenier Groep. The remaining beef comes from Argentina, Belgium and Germany.

The baseline situation includes standard mitigation measures currently being taken. The base case has been used to assess Extra Mitigation measures (EMMs) (table 4.7, 4th column, 'EMMs'), an overview of which is given below.

Land use

The land take can be reduced by intensifying production, i.e. more cattle per hectare. However, this benefits neither the welfare of the animals nor the biodiversity of the land used. Another option is to make the cattle farming more extensive. This will increase the land take, but may be profitable for the variation in the landscape and its biodiversity value.

Transport/energy/methane emissions

The number of transport kilometres is significantly reduced when the company switches to using cattle kept in the Netherlands. A point of particular interest to the Kruidenier Groep is the fact that the Dutch beef must be of an excellent quality. The Kruidenier Groep went to Austria in the past due to the fact that the quality of the Austrian beef has been of a higher standard than the Dutch beef in the opinion of the Kruidenier Groep and its meat supplier, Vlees en Vleeswarenbedrijf Ruitenburg.

Apart from a transition to Dutch beef, the volume of transport can be reduced by having the cattle slaughtered in Austria rather than in the Netherlands. This is especially interesting when the offal can also be disposed of in Austria. This is the case and this mitigation measure has been implemented as of 2009 as a result of this project.

As far as energy is concerned, mitigation measures can also be taken in the field of sustainable energy, increasing energy efficiency in production processes or using energy-saving vehicles and equipment. Options in this respect will be considered by the Kruidenier Groep, but have not been further specified within the project.

A different cow diet and/or capturing methane from within the cowsheds are options to minimize methane emissions. No specific attention has been paid to these considerations given the ideas on the use of Dutch cattle for beef products. This point of interest will be taken along in the context of the transition.

Water
Although the exact figures are not known, significant amounts of tap water are needed for the cleaning of transport vehicles and during production processes in the Netherlands. The Kruidenier Groep will liaise with the company responsible for the cleaning of the exterior of the vehicles (for which they take along themselves the cleaning water in tanks) to which extent less water and/or collected rainwater can be used. Also, the Kruidenier Groep will investigate the possibility of using collected rainwater for production processes. For this, first, it needs to be investigated if such use does not interfere with food security regulations. Both of the issues could not be dealt with within the BioCom timeframe, but opportunities will be looked into by the Kruidenier Groep outside of the project.

Waste
Flows of waste are increasingly being recycled, but could also be examined for better opportunities for reuse, different recycling processes, etc. to attain the maximum benefits. Also, reducing inputs to limit flows of waste and/or the use of inputs less damaging for the environment, health, etc. could be considered. The Kruidenier Groep is very involved in this topic. New ideas are being developed, for example, in the field of biogasification.

Biodiversity footprint

The footprint of the Kruidenier Groep has been calculated based on the resource use and discharges, including the application of any extra mitigation measures.

A difference can be made between the annual biodiversity footprint and the footprint related to historical losses. The annual biodiversity footprint comprises of the biodiversity loss per year as a consequence of present activities. The question how to compensate for historical biodiversity losses due to factors other than land take appeared impossible to answer within BioCom due to a lack of information. Consequently, the discussion was limited to historical losses following land conversion in the past that gave way to the current business activities.

The footprint of the Kruidenier Groep, as far as the Austrian beef supply chain is being concerned, has been calculated as follows (see tables 4.7, 4.8 and 4.9):

Land use
Land use concerns the pastureland in Austria (1,713 ha of grasslands where the cattle are kept for grazing and winter feed is being produced) and the offices (12 ha) in the Netherlands. To calculate the biodiversity footprint, the MSA methodology has been used to assess the level of biodiversity change over the years in comparison with the naturally present biodiversity (see section 3.3.4).

The area in Austria has long been used as pastureland for cattle; since the Kruidenier Groep started to purchase cattle from this area through its supplier. An MSA of 0.6 is being assigned to grasslands with extensive cattle farming according to the MSA database[18]. This means that 60% of the original biodiversity is still present in the area, despite the economic activities. Assuming that the area maintains a residual MSA of 0.6 over time and does not further degrade as a result of the extensive cattle farming, the annual biodiversity footprint in Austria can be set at 0 ha as far as land use is being concerned. After all, the biodiversity is not further in decline following the continuing supply chain activities of the Kruidenier Groep.

Still, the ongoing use of the area as pastureland for cattle prevents the restoration to a more natural situation. In theory, it is assumed that the area will fully recover, should the economic activities be ceased; that means that the MSA would rise from 0.6 to 1. In case the Kruidenier Group would bear the responsibility for the historical MSA loss of 0.4, the land use biodiversity footprint in Austria amounts to 685 ha.

18 Alkemade, R., van Oorschot, M., Miles, L., Nellemann, C., Bakkenes, M. en ten Brink, B. (2009) GLOBIO3: A Framework to Investigate Options for Reducing Global Terrestrial Biodiversity Loss. Ecosystems 12, 374-390.

The land use biodiversity footprint in the Netherlands is 0 ha, excluding historical loss. The Kruidenier Groep moved into the offices, when these were already in use as a production location. Again, the ongoing use of this location prevents the recovery of the biodiversity value in the area. Assuming that the residual MSA of the area currently is 0.1 – there is little original biodiversity left – the biodiversity footprint for land use in the Netherlands amounts to 10.8 ha, including historical loss.

CO_2 (equivalent) emissions

Considering the current beef production for the purpose of the Kruidenier Groep, CO_2 is mainly being emitted as a result of diesel use for transport and refrigeration. Further, the methane emissions of cattle in Austria are the main cause for CO_2 equivalent emissions. The volume of emissions resulting from the electricity use in the Netherlands is unknown.

Water use

There is a lack of water footprint models or other general applicable methodologies to assess the impacts of water use on biodiversity. Within BioCom, water use pressure in the different parts of the supply chain has been assessed on the basis of global water stress models (see section 3.3.4).

As far as water use is concerned, it can be said that Austria and the Netherlands do not experience water stress[19]. Research on the ground to verify local water stress (in and around the production areas) has not been carried out. Groundwater is being used for the cattle and pastures in Austria. Water use in the Netherlands for the beef production mainly concerns tap water for cleaning and production processes.

Miscellaneous

The main impacts in the pressure group 'miscellaneous' for the Kruidenier Groep's beef supply chain result from remnants of cleaning products in waste water, solid waste (manure and straw) and transport emissions (apart from CO_2). Their biodiversity impacts are not only difficult to establish, but also considered small (according to experts) compared to impacts resulting from land use and CO_2 emissions. Therefore, no further attempts have been undertaken to calculate their biodiversity footprint. At this point, these impacts can best be reduced by implementing mitigation measures.

19 This information is based on expert advice and models from the Netherlands Environmental Assessment Agency.

Table 4.7: Kruidenier Groep Biodiversity footprint

Impact categories	**Resource use and discharge** **Base case**	**Annual biodiversity footprint** **Base case**	**Extra mitigation measures (EMMs)**	**Resource use and discharge** **+ implemented EMMs**	**Annual biodiversity footprint**	**Biodiversity footprint** **Historical loss**	**Remarks**
Land use							
Grasslands (cattle to pasture, production of winter feed), Austria	1,713 ha	0 ha	A higher density of cattle per hectare is not desirable from the view of animal welfare and higher impact per ha; more extensive farming increases land take. Both measures are not options as yet.	1,713 ha	0 ha	685 ha	
Land use of offices, Netherlands	12 ha	0 ha	None; extension of activities can take place at the same location with efficient planning.	12 ha	0 ha	10.8 ha	
CO_2 (equivalent) emissions							
Methane emissions by cattle, Austria	892,946 kg CH_4	20,537,768 kg CO_2	Changing of diet, capturing methane from within cowsheds	< 892,946 kg CH_4	< 20,537,768 kg CO_2	Unknown	Historical CO_2 emissions not taken into account
White diesel, transport Austria-Netherlands and within the Netherlands	58,714 l	157,354 kg CO_2	More efficient transport (e.g. different truck engines), use of sustainable biodiesel, slaughtering in Austria instead of the Netherlands	< 58,714 l	< 157,354 kg CO_2	Unkonwn	Idem

Table 4.7: Kruidenier Groep Biodiversity footprint

Impact categories	**Resource use and discharge** **Base case**	**Annual biodiversity footprint** **Base case**	**Extra mitigation measures (EMMs)**	**Resource use and discharge** **+ implemented EMMs**	**Annual biodiversity footprint**	**Biodiversity footprint** **Historical loss**	**Remarks**
Red diesel, refrigeration during transport Austria-Netherlands and within the Netherlands	25,000 l	67,000 kg CO_2	More efficient/ energy-saving refrigerating engines, use of sustainable biodiesel, slaughtering in Austria instead of the Netherlands	< 25,000 l	< 67,000 kg CO_2	Unknown	Historical CO_2 emissions not taken into account
Electricity use of production processes, Netherlands	Unknown	Unknown	Use of 'green' electricity, changing to more efficient production processes	Less electricity use	Unknown	Unknown	Idem
Water use							
Groundwater, keeping of calves and cattle, Austria	171,250 l	None	None	171,250 l	None	Unknown	Historical water stress not taken into account
Tap water for cleaning of transport vehicles and during production processes, Netherlands	Unknown	None	More recycling, water-saving/efficient processes, collecting rainwater	Less water use	None	Unknown	Idem

Table 4.8: Biodiversity footprint Kruidenier Groep - miscellaneous

Resource use and discharge	**Biodiversity footprint Base case**	**Remarks**
Cow urine, Austria	25,002,000 l	Effect on soil and ground water is not known.
Solid waste (manure and straw), Austria, and during transport to the Netherlands	Unknown	Slaughtering in Austria instead of the Netherlands prevents the existence of this flow of waste during transport to the Netherlands.
Waste water with remnants of cleaning product, Netherlands	Unknown	Neither the number of litres of cleaning product needed to clean the trucks in the Netherlands, nor the potential foot print of remaining waste water is known. Extra mitigation measures would be the use of cleaner products (although the cleaning product is already biodegradable), less use of cleaning products and the slaughtering in Austria instead of the Netherlands to reduce the need for cleaning.
Emissions of transport (apart from CO_2)	Unknown	No methodologies are known to translate these emissions into a footprint. Extra mitigation measures would be the use of white instead of red diesel to reduce the emissions of sulphur, and/or the use of sustainable biofuels.

Table 4.9: Accumulated biodiversity footprint Kruidenier Groep

Impact categories	**Annual biodiversity footprint** **Base case**	**Annual biodiversity footprint** **Based on implemented EMMs**	**One-time biodiversity footprint due to** **Historical loss**
Land use Austria	0 ha	0 ha	685 ha
Land use Netherlands	0 ha	0 ha	10,8 ha
CO_2	> 20,762,122 kg CO_2	reduced emissions kg CO_2	Unknown
Water	None	None	Unknown

Compensation plan

The main impacts on biodiversity of the beef supply chain are connected to land use and CO_2 (equivalent) emissions resulting from transport throughout the supply chain and methane emissions by cattle. Research on compensation options focused on these two impact categories. The following ideas were under discussion:

Land use change
- Compensating of land use in Austria or Eastern Europe.
- Compensating of land use in the Netherlands by stimulating the recovery/conservation, management and use of biodiversity-rich peatland.

CO_2 (equivalent) emissions
- Compensating of CO_2-emissions in Uganda.

Compensation of land use

Foundations of choice
Possibilities have been assessed to compensate the land use in Austria by implementing activities in Austria or Eastern Europe. As there was a wish, however, to opt in favour of compensation activities that would be visible to Dutch customers, possibilities to be undertaken in the Netherlands were thereupon investigated.

The Blaarkop breed (also known as the Groningen White-headed) came up during discussions on compensation options. The Blaarkop originates from the Netherlands, and has a cultural-historical value. The Blaarkop faded into the background due to the fact that its milk yield cannot match the volume of, in particular, Holstein Frisian cattle and its meat yield cannot compete with the yield of breeds specifically kept for meat. The Blaarkop is a so-called dual function /breed– delivering both dairy as well as high-quality meat products – that is particularly suited for extensive farming practices in the Netherlands (wet grasslands). Moreover, it has a strong health (veterinary attention is not much needed) and can quite easily cope with natural barriers in nature areas. Farming Blaarkop cattle therefore offers a good combination with the restoration of degraded peatlands.

The opportunities offered to the Kruidenier Groep and its supply chain partners by a transition from the Austrian beef to dairy and meat products from the Blaarkop have been the point of departure when drawing up the compensation plan.

The following choices have been made to specify the compensation plan:

1. *Compensating of the land use in Austria by investing in the conservation and upgrading of biodiversity-rich peatlands in the Netherlands;* parallel to the investments in biodiversity, social-economic developments are being encouraged by developing a market for this particular cattle breed at pasture in the peatlands (extensive farming). This supports the long-term feasibility of the compensation plan, because attention for biodiversity is linked to market development. The Blaarkop is a breed pre-eminently suitable for pasturing in areas with high groundwater table and low-nutrient vegetation with structure-rich grass (similar to peatlands).

2. *Switching the operational management over from Austrian beef cattle to the Dutch Blaarkop in 5 to 10 years;* this period is needed because the population of pure Blaarkop cattle is small these days in the Netherlands and cannot comply with present demand from the Kruidenier Groep. In the end, transport movements will reduce by 80% as a result of the transition.

From a biodiversity point of view, a new situation arises once the yield of Blaarkop meat and meat products is sufficiently large to fully supply the volume asked for by the Kruidenier Groep (through its supplier Ruitenburg). At that time, the question whether or not the changed supply chain has a residual negative impact on biodiversity can be posed again. Research will be needed to assess the magnitude of a potential footprint. The compensation plan drawn up at this stage identifies and calculates the compensation based on the current supply chain activities.

Size of the compensation area
Land take amounts in total to 1,713 ha in Austria and 12 ha in the Netherlands. The impact in the Netherlands, a calculated footprint of 10.8 ha, has not been taken into account in the compensation. In proportion to the impact in Austria, this concerns a negligible amount of hectares.

Compensation of the land use will take place in Dutch peatlands. This type of pasture area potentially offers a higher variety in agro-biodiversity than the grasslands in Austria, and the compensation format is therefore deemed acceptable. The Netherlands Environmental Assessment Agency estimates that degraded peatlands in the Netherlands on average have an MSA of around 0.4[20]. This MSA can be enhanced up to a maximum of around 0.9 (among others by increasing the water table).

The land use in Austria causes an area of 1,713 ha to experience a decrease of 0.4 MSA (historical loss). To compensate for the historical loss, the MSA of an area of 1,713 ha needs to be upgraded by 0.4 MSA, so, for example, the MSA of 1,713 ha of Dutch peatland is improved from 0.5 to 0.9. Only 685 ha are needed for compensation if the MSA could be improved from 0 to 1 in this area (and 3,426 ha of 0.2 MSA upgraded land, etc.). Self-evidently, the Kruidenier Groep consults stakeholders before defining the compensation area.

The current annual demand of the Kruidenier Groep is based on around 3,400 head of cattle. Approximately 0.6 ha of peatland is needed per Blaarkop. The number of Blaarkop cattle aimed for therefore needs a peatland for pasture of at least 2,100 ha, and this area needs to be improved by at least 0.33 MSA to match the required compensation for the historical land use change in Austria (assuming that the area will be managed for raising beef cattle despite the end of the contract with Kruidenier). A larger area and/or achieving a higher increase in MSA will result in a net gain of biodiversity. Such compensation would coincide with situation 2B in figure 3.1 (section 3.2.2).

Based on the above, a compensation specification is proposed concerning the management of an area of peat of approximately 2,100 ha. This involves both the conservation as well as the upgrading or development of peatlands. It is assumed that this is sufficient to compensate for the impact in Austria. An additional advantage of any investments in the quality of peatlands is the resulting prevention of the release of carbon stocks in the soil (these days, many peat soils slowly silt up as a result of draining and tillage). Although this positive effect is known, no detailed data or figures are available yet. This process has therefore not been taken into account in the calculations.

Development time
Currently, Blaarkop cattle are in short supply and cannot meet the demand from the Kruidenier Groep. Moreover, a consistent quality of the meat products is lacking due to a large diversification within the current population. In consultation with the Blaarkop Studieclub (a study group focused on Blaarkop cattle), the compensation is being scheduled as followed:

1. Phase one, years 1-5: Preparations to upgrade 2,100 ha of peatlands in combination with the development of a breeding and growth program for the Blaarkop.
2. Phase two, years 5-10: Starting to purchase 20 Blaarkop head per week; the remaining beef demand is being satisfied with beef products from Austria. Further: gradual decrease in Austrian beef products and building up of Dutch yield.
3. Phase 3, as from year 10: Full transition to Dutch Blaarkop cattle (the current processing is around 70 animals a week).

Compensation of CO_2 (equivalent) emissions

Foundations of choice
The compensation format has not yet been chosen. The opportunities will be investigated with a particular focus on a verifiable reduction or capture of CO_2 in Uganda. This could be realized by investing in renewable energy sources (possibly biogas) or sustainable biomass

20 Alkemade, R., van Oorschot, M., Miles, L., Nellemann, C., Bakkenes, M. en ten Brink, B. (2009) GLOBIO3: A Framework to Investigate Options for Reducing Global Terrestrial Biodiversity Loss. *Ecosystems* 12, 374-390.

production, for example by planting fruit trees, the yield of which could be marketed through the Kruidenier Groep. Uganda has been selected as a potential country for investigation, because of the existing contacts of the Kruidenier Groep in Uganda. The owner and managing director of the Kruidenier Groep, Peter Kruidenier, supports 'Peter's primary school', a school for (orphan) children (see: http://peters-primaryschoolmalindi.com/nl/projectnu.html). There is fallow land around the school. CO_2 compensation can possibly link up with development of this area.

Scope of the compensation
The CO_2 biodiversity footprint amounts to approximately 220 ton for transport and 20,000 ton for methane emissions. Existing CO_2 compensation mechanisms translate tons of CO_2 emissions into cash. Depending on the compensation mechanism chosen, a ton of CO_2 will generally cost a buyer between 5 and 12 Euro. In this compensation plan, the calculation is based on a price of 10 Euro per ton of CO_2. This means that compensation of transport would come down to 2,200 Euro on a yearly basis, while compensation of methane emissions would become 200,000 Euro per year. A rough calculation, including some assumptions on methane emissions of Blaarkop cattle, shows that compensation would come down to 1.50 Euro per 100 grams of meat. Due to some uncertainties in calculation, the high costs and effects on the price of meat, and the link to a larger discussion in society about sustainable beef products, it has been decided to exclude methane emissions from the compensation plan at this stage. However, it is clear to the Kruidenier Groep that the topic of methane emission deserves further research into mitigating and compensation options within the framework of a sustainable beef supply chain.

Development time
Only one option currently exists to verifiably compensate for CO_2 emissions in Uganda. This concerns afforestation by FACE in the north of Uganda. Other possibilities are still under development. It is expected that Hivos will start with a biogas project in Uganda in 2009, that will offer opportunities for compensation projects. Moreover, it can be investigated whether it will be possible to obtain a compensation certificate for the cultivation of fruit trees in the school area (mentioned before). Compensation decisions will be taken when more information about the set of opportunities is known.

Implementation plan

Land use
The Kruidenier Groep has already started off the process of land use compensation. It has sought contact with some key experts and stakeholders on the transition to Blaarkop cattle aimed for during the writing of the compensation plan. It has been decided that, first, a feasibility study will be carried out in the course of 2009. This study has to show that the transition can indeed be realized and that the main stakeholders (including supply chain partners like Ruitenburg) wish to commit themselves to the transition. When the feasibility study has a positive outcome, the further transition will be achieved by way of pilot projects and up-scaling.

CO_2
Compensation of land use will be the Kruidenier Groep's first priority. The Kruidenier Groep will dedicate a significant amount of time and attention to this compensation in the coming time. The compensation of CO_2 emissions will be dealt with in a later phase, when the plan of approach for land use compensation has been developed and implementation has started. The CO_2 compensation opportunities will then be examined in consultation with Hivos and engagement with stakeholders will take place to learn how compensation can best be realized.

Observations

Some observations relating to the specific characteristics of the Kruidenier Groep case are:

• *Spin-off in the assortment*

The Kruidenier Groep is trading thousands of products. The beef supply chain as the central topic within BioCom has been a conscious choice. However, the Kruidenier does not consider this an isolated case. Sustaining one product goes hand in hand with a next step in the field of sustainability. During the project, a connection between the compensation and other products traded by the Kruidenier Groep has already been actively searched for to realize a spin-off in the assortment. It has therefore been decided to market not only beef products from the Blaarkop, but dairy products as well. Another link has been identified in respect of the CO_2 compensation, for which the cultivation of trees can be coupled to the marketing of fruits through the Kruidenier Groep.

• *Supply chain initiative*

The Kruidenier Groep connects hundreds of suppliers and thousands of customers. In this position, the Kruidenier Groep is often the initiator of sustainability projects, such as the introduction of organic products in the assortment. The Kruidenier Groep is fully aware of the fact that it is of vital importance that the responsibility for initiatives and results aimed for is borne throughout the supply chain. Knowledge is being transferred to both suppliers and customers to create commitments, also in the financial sphere. As such, the Kruidenier Groep has already contacted several stakeholders (such as public authorities and the Blaarkop Studieclub) and supply chain partners (which include Ruitenburg and catering company Albron) about the Blaarkop during the development of the compensation plan. The investments needed by each of the parties have also been discussed.

• *Business approach*

Good initiatives in the field of sustainable production frequently fail because the approach is only focused on the supply part and/or 'green' nature of the project, and little attention is paid to market demand and financial feasibility (the economic part of sustainability!). The Kruidenier Groep opts for a business approach with the Blaarkop that will serve both biodiversity and social-economic developments. Sufficient market demand enables farmers to put their cattle to pasture in swampy peatland in a profitable way. The willingness of the Kruidenier Groep and Ruitenburg to purchase Blaarkop cattle brings long term management of the peatland, it is financially viable and gives certainty to the supply chain partners involved (such as farmers).

4.4 General conclusions and recommendations

Conclusions

The three summaries clearly show that, as yet, there is no such thing as one process, one kind of plan or one kind of methodology that prescribes the most suitable format for a compensation plan. BioCom has been a pioneering project in its kind and experiences gained are the materials of a general process and methodology of how supply chain compensation should be carried out. The project has delivered significant input and lessons have been learned for though for follow-up activities.

It has also become evident that supply chain compensation demands huge efforts from companies since there are so many different biodiversity pressures of different dimensions, either current and/or historical, and so many different stakeholders involved. Data in one supply chain may be much more accessible than in the other chain and so will there be a difference with respect to the willingness of supply chain partners to cooperate. This kind of aspect co-decides the set-up, extension and level of detail of the compensation plans.

A final conclusion that can be drawn is that – generally – choices will need to be made with respect to the extent of compensation. Compensating for all impacts throughout the supply chain, including historical losses, will often not be attainable for one company from a financial point of view.

Recommendations

Biodiversity compensation could help to fulfil wishes to enhance and maintain biodiversity left and restore degraded areas. For that, it is essential that more experience is gained with biodiversity compensation of existing supply chain activities, and that this experience is shared!

Moreover, an awareness or promotion campaign is recommended to draw companies' attention to this topic. BioCom has delivered insights which show that supply chain impacts – especially the historical ones in respect of land conversion – can be huge. These impacts should be counteracted on a large scale, both for the sake of biodiversity and the sake of companies. Natural resources and ecosystem services are essential for the functioning of supply chains. Therefore, we need more supply chains to work on biodiversity compensation. Awareness is needed to create motivated companies and set them into action.

Awareness is also needed to increase the willingness of supply chains to cooperate with a compensation plan initiated by one of the other supply chain partners. Losses are too big to be covered by companies on their own. Costs need to be shared, up to and including the end-user.

Finally, it is recommended to work towards guidance or a format for pro-active companies that wish to go ahead with biodiversity compensation; initiated, for example, by a government or the CBD. Some guidelines and formats are available for compensation of direct impacts of new developments. This kind of compensation is already taking place, often based on laws and legislation. But supply chain compensation is a new field of work that asks for a different approach. A first start of guidance has been introduced in part VI.

Part 5

Lessons Learned on supply chain compensation

PART V - LESSONS LEARNED ON SUPPLY CHAIN COMPENSATION

BioCom has been innovative in its kind and has made a first step towards supply chain compensation. It is clear that the format still has to take shape. We wish to share the lessons we learned during BioCom to facilitate and support a next project in this field, other supply chain initiatives or perhaps even legislation.

5.1 Introduction

All lessons learned have been categorized in one of the following groups:
- Policy and principles
- Assessment
- Implementation
- Management and Reporting

Each 'lesson' starts with a short explanation of its contents, to be followed by the relevance of the theme for biodiversity compensation. We then share our BioCom experiences and, when relevant and appropriate, we explain the approach chosen and/or any dilemmas that have arisen. We conclude this part with some overall conclusions and recommendations.

5.2 Policy and principles

5.2.1 Concept of biodiversity compensation

[relates to sections 3.2.1 and 3.2.2]

Biodiversity compensation is based on the assumption that a company can make up for the (expected) residual loss of biodiversity occurring due to the execution of certain business activities, after first attempting to fight the sources of that impact and implementing mitigation measures.

Relevance of the theme

Habitat loss and fragmentation, pollution, invasive species and climate change are the biggest threats to biodiversity. They are the direct result of economic activities. Principles such as 'precautionary principle' and 'polluter pays' are well accepted and force businesses and others unfolding commercial activities to minimise their environmental impacts, including those on biodiversity. However, practical implementation of those principles still lags behind. Legally binding and voluntary compensation are upcoming tools to halt the loss of biodiversity.

BioCom experiences

While working on biodiversity compensation plans for the companies involved we learned the following:

- NGOs made it clear that, in their view, compensation is not always allowed and not a way to merely justify impacting biodiversity. They adhere to the principles of 'no go' cases, for instance when it concerns illegal activities, activities that threaten Red List species, or activities in Protected Areas and areas regarded as containing highly valued biodiversity (hot-spots of biodiversity).
- Compensation must – in principle – deliver a no net loss situation. BioCom did set the following conditions for biodiversity compensation:
  - all biodiversity lost (quantitatively and qualitatively) will need to be compensated, whether through restoration, improvement or avoidance (see section 3.2); and
  - the biodiversity value (aimed for) of the compensation area minimally equals the qualitative biodiversity value of the impact area.
- Transparency, additionality and marketability (to stakeholders) of

compensation plans are essential, especially in the case of voluntary compensation. Companies working towards voluntary compensation are frontrunners that run the risk of being criticized since the concept of compensation is not fully developed yet.

Moreover, we experienced that specific attention needs to be given to one-time versus recurring (e.g. annual) impacts on biodiversity. Can they be dealt with in the same compensation plan? Example: the land use footprint methodology used taught us that the annual impacts of activities were often low compared to the biodiversity loss resulting from the one-time historical land use change when a natural area was converted for economic use. This may be difficult to understand (and accept) by stakeholders when, for example, tons of fertilisers are used every year to make up for mineral losses due to harvests. The debate on this issue coincided with discussions on the planning and implementation of the compensation, in one go or gradually, over several years.

Approach chosen

Certain elements need to be addressed when contemplating biodiversity compensation. Examples are the application of the mitigation hierarchy (extent of application depends on the cost versus the effect of the measures taken), the 'no net loss' principle (what does it mean in the given situation, is it a useful target?) and stakeholder engagement (who and when). There is neither a one way entry towards the outcome nor a full set of pre-determined conditions. In BioCom we followed the case-by-case approach, in the sense that we started from a general set of applicable principles following which each compensation plan was discussed and agreed upon by the relevant stakeholders.

Dilemmas

The following dilemmas were encountered:

1. Outcome versus effort
Should biodiversity compensation be outcome-binding or effort-binding? Given the fact that BioCom concerned voluntary compensation, the participants felt that it could not be an outcome obligation but effort-binding instead. Nevertheless it was clear that the compensation plan had to state specific goals and agreements between parties.
Irrespective of whether the compensation is legally binding or voluntary, the participants felt that 'results' in terms of measurable biodiversity outcomes would be difficult to deliver. Not only because biodiversity is dynamic, but also because most ecosystems take longer to recover or build than the life expectancy of a company.

2. One size fits all?
Although starting from the same model and principles, the three companies in BioCom did come up with compensation plans that are different in nature of compensation, reflecting the case-by-case approach when it comes to filling out the details, as these are linked to company-specific features. Would it be better to strive for one methodology – for example on a fixed cut-off date for historical losses – applicable to all companies, creating a level playing field? Or would it make more sense to hand different options to companies to enable them to choose, depending on their situation, activities, availability of data, stakeholders, etc.?

5.2.2 Historical loss

[relates to section 3.2.3]

Historical loss of biodiversity is the difference between the original, 100% natural biodiversity in an area and the biodiversity still present upon the start of the company's presence or influence.

Relevance of the theme

The main issue with respect to historical loss is the question of responsibility. Who takes up responsibility and who is willing to compensate for that loss? Companies generally object to the idea of making up for biodiversity loss that occurred prior to their presence or influence; they blame previous business activities for this loss. However, this historical loss ultimately has given way to and still enables the current business activity: if the land cover and use had not been changed in the (recent) past from 100% natural biodiversity to land under a certain type of economic use, the current activity could

not have been executed. Business profits today thus result from that historical land use change. So in the view of certain stakeholders, companies should take this historical loss into account. Moreover, the current, continued economic activities prevent the land from returning to a more natural situation.

But is it fair to ask companies to compensate for historical loss? Why would companies need to take (part of the) responsibility for historical biodiversity losses while society as a whole – thus including customers, governments, etc. – can collectively be held responsible for the continued biodiversity loss? They profited from such economic activities as well. Whereas there is legislation today that defines the terms of compensation for new impacts on biodiversity (e.g. the EU Habitat Directive), there is no legal requirement for taking up historical loss into compensation plans. Consequently, it is a matter of company principles, feasibility, sector code of conduct, and/or stakeholder pressure whether or not to compensate.

BioCom experiences

In BioCom we faced the following difficulties when applying the concept of accounting for the historical loss of biodiversity:

1. Compensation for biodiversity loss is already a complex subject in itself given the many interactions between businesses and biodiversity. We did not only consider habitat loss, but also other drivers for biodiversity loss such as emissions to air, water use, waste, spills, and disturbance due to noise, heat and light. Compensation for historical loss preferably includes the latter categories as well. The question how to compensate for historical biodiversity loss due to factors other than land take appeared impossible to answer (lack of information). Consequently, the discussion was limited to historical loss as a result of land conversion, also justified by the fact that, in general, land use change is by far the biggest threat to biodiversity.

2. It became clear to the business activities under consideration in BioCom that, on a comparative basis, the biggest losses of biodiversity occurred in the past and these were related to converting natural land into production areas. Current activities do not substantially aggravate those losses. This opened up the discussion on the moral responsibility for companies to compensate for (part of) such historical losses.

3. In our discussions, sentiments and expectations differed between the companies and governmental bodies/NGOs. Also, the supply chains involved were judged differently: cattle grazing on alpine grasslands in Austria are much less linked to historical loss of biodiversity than palm oil production in Malaysia. In fact, in the case of alpine grasslands, the current state of biodiversity is considered by some to be of a higher value than the original state.

4. A major obstacle for companies to address historical biodiversity losses in their compensation plan concerns (the uncertainty of) the costs involved, i.e. the financial feasibility of the compensation. It is highly unlikely that 100% compensating for historical loss is affordable.

Approach chosen

When a company determines the scope of its compensation, it has to stipulate its position towards this theme: will it consider compensating for historical biodiversity losses? If so, will compensation be complete or partial? Within the project, historical losses appeared to be a topic that created many discussions, conflicting opinions and different sentiments. BioCom-participating companies decided to choose for the 'no but …' approach (see section 3.2). They felt only responsible for biodiversity losses created by own, current activities, though wished to try covering a part of the historical loss for reasons of ethical trading, marketing or enhancing stakeholder relations.

In our attempt to design a framework for dealing with historical losses, we identified some principles:

- A company is always responsible for its own impact; if such impacts occurred in the past, they do – in principle – not cease to remain this company's responsibility.

- Historical losses should be addressed in compensation plans, as land use continues and prevents the return to a natural state. They are the shared responsibility of previous and current users. In the compensation plan, the company will explain its decision how it deals with this shared responsibility.
- Stakeholders in this debate should be aware that practical considerations ultimately determine the level of compensation for historical losses, such as existing knowledge, funds, type of business (today's link with previous land use activities), stakeholder support, etc.
- Biodiversity (impacts) should be paid for and incorporated in prices to cover historical and ongoing biodiversity loss.

Dilemmas

The following dilemmas were encountered:

1. Original habitat – what is the reference situation

The first question to address when discussing compensation for historical biodiversity loss is the reference point for 'original' biodiversity. What is the point of reference? The Netherlands Environmental Assessment Agency has defined that point for many ecosystems and habitats, the MSA, - based on extensive literature research (see box 3.1). Even so, choosing a reference and deciding how far back one puts that timeline is not without debate. Are the current peat grasslands in Europe the point of reference (because of their high biodiversity value) or is it the pre-medieval primary forest, which most probably contained less biodiversity? In absence of (inter) nationally agreed regulation and guidance to create a level playing field, companies need societal consensus-based choices as they cannot make such decisions by themselves. Moreover, a discussion is essential since companies cannot bear the responsibility by themselves (even if they wanted to) for major historical biodiversity losses that have occurred.

Options for a reference point discussed include:

Cut-off date

Would it make sense to decide on a cut-off date that serves as the moment from which historical loss is taken into account in compensation plans? Example: RSPO took November 2005 as a cut-off date; after this date, its code forbade the conversion of high conservation value areas into production areas for palm oil plantations. Companies applying for certification need to comply with this code. Again, it requires extensive stakeholder engagement and consensus-based decisions before such a code can be realized.

Choosing a cut-off date prevents a discussion on what exactly the reference situation should be (see above). It could be defended as a logical step given the idea that biodiversity compensation is a relatively new concept, for which the criteria are set today. On the other hand, it disadvantages frontrunners making agreements on cut-off dates in the near future and benefits companies/sectors that decide to use a longer time scale.

Depreciation

Another option would be to introduce a depreciating factor, through which one can calculate a percentage of historical loss to be compensated. For example, if land was converted in the last year, the percentage of land use to be compensated would be 100%; if land was converted 100 years or more ago, the historical biodiversity loss to be compensated would be 0%. A percentage per time period to complete the scale between 0 and 100% would have to be agreed upon by stakeholders per habitat type. Following this line of thinking, companies should then compensate for the historical loss to a percentage being equal to the depreciated 'biodiversity value'. The downside of this approach is that it would pay off for companies to wait with compensation to avoid costs.

Ecosystem state

A reference point can be the natural situation (such as pristine rainforest), but also other ecosystem conditions that are generally agreed to present valuable biodiversity elements. For instance, species-rich alpine meadows are highly valued landscapes across Europe. As such, they present a biodiversity element worth conserving and therefore also worth compensating. The desired ecosystem state as reference point in each specific region should be agreed upon by stakeholders.

2. Relationship between company activities and historical biodiversity loss
An interesting question is whether a company is responsible for compensating historical loss of biodiversity only when it actually contributed to this loss itself – directly or indirectly through its activities – or should it always take (part of the) responsibility since its current activities prevent the biodiversity from returning to its original state? We could not find a straight answer to this question. Since compensation for historical loss of biodiversity is a voluntary action that requires a case-by-case approach, we concluded that this question would need to be addressed in that process.

3. Incentive
When regulation would exist obliging all companies to take full responsibility for biodiversity loss – irrespective of when it occurs/occurred – there is no incentive in using already degraded areas over converting biodiversity-rich locations. Companies would have to pay full compensation in both cases, and many companies will then consider it beneficial to take advantage of the yield of biodiversity-rich locations (especially timber). This is an undesirable outcome that needs to be avoided. Society should implement a system of incentives for achieving best biodiversity conservation and sustainable use outcomes.

4. Developed versus developing countries
When historical loss is not incorporated into compensation plans, companies in developing countries are criticised for currently converting biodiversity-rich areas while companies in the developed countries have freely done the same in the past without ever having taken responsibility. This is an additional dilemma in the historical losses' discussion that deserves recognition.

5.2.3 Supply chain responsibility

[relates to section 3.3.1]

Supply chain responsibility is defined in this context as taking compensation responsibility for impacts on biodiversity up and/or down the chain of suppliers and customers, that arise from activities that are beyond the immediate control of the company that takes the compensation responsibility.

Relevance of the theme

Ideally, each supply chain actor – including the end consumer – takes responsibility for mitigating and compensating its biodiversity impacts and, where possible and allowed, incorporates the costs for it in the price. However, reality shows a different world. The question arises: should a company take responsibility for direct and/or indirect negative biodiversity impacts in the supply chain (regardless of its own position in the supply chain whether it be in the beginning, in the middle, or at the end) and if it does, should that be for all those impacts or just for a part – for example, the most significant ones? This issue was frequently under scrutiny within BioCom; it also links to discussions on historical loss and indirect effects. There is mounting societal pressure to do so, especially on those companies that are considered to be leading in supply chains. As an example, society would have greater expectations of a multinational company in taking responsibility for negative impacts occurring in its supply chain than it would of a smallholder producer.
Supply chain responsibility is often clear from a legal point of view but not just limited to legal aspects. It predominantly focuses on ethical topics related to sustainable development and corporate social responsibility for which no legislation exists. That is the entry point for stakeholders for their call upon companies to take up 'chain responsibility'. A good option to achieve a sustainable supply chain is when parties in the chain work together to come to full responsibility and transparency. Companies could ask their suppliers to show compliance with sustainability standards set, and gradually work/improve on the compensation issue.

BioCom experiences

In BioCom we experienced the following:

1. The extent of responsibility allocated by stakeholders to companies differs, depending on the type and location of activities. Example: in the opinion of NGOs, a company like the BioX

Group should take responsibility for compensating the impacts on biodiversity that originate from palm oil production and even for taking up compensation for some of the recent deforestation in Asia that takes place to enable the establishment of new palm oil plantations. It should be so even if the BioX Group itself has neither been involved with deforestation nor been active in palm oil trading at the time of land conversion. At the same time the Kruidenier Groep is not held accountable, through similar chain responsibility, for compensating the cutting of primary forests in Central Europe some hundreds of years ago (although their current activities prevent the area from returning to a natural state).

2. When it comes to taking responsibility for biodiversity loss in the supply chain, the question arises: 'where does the supply chain responsibility stop and does society's responsibility start?' This is a discussion on boundaries: for which part of the value chain can a company be held responsible? We could not find an unambiguous answer to this question. Companies should try to seek consensus of opinion with key stakeholders in respect of this matter.

3. Another question is about the share that can be contributed to the different supply chain partners. Ideally, each of them takes responsibility for its share. We experienced an expectation that the economically more powerful supply chain partners should bear larger responsibility. Moreover, the production or extraction of the raw materials generally generates the bigger impacts on biodiversity. It could be argued that these impacts should be carried by the entire supply chain given the fact that they all profit from this production / extraction (this could be done by incorporating the compensation costs in the price for the raw material).

4. The companies consider themselves primarily – and are legally – responsible for their own activities. Only second to that they feel bound to an ethical responsibility for biodiversity impacts occurring in other parts of the supply chain. However, the actual biodiversity compensation could deviate from this order of responsibility. If stakeholders feel that a company should take responsibility for certain aspects – such as a significant biodiversity impact created by another supply chain partner – this generally results in a change of business policy. For example, working together with supply chain partners towards a greener production by implementing a different production process.

Approach chosen

The starting point was that all biodiversity impacts in the supply chain should be compensated, including impacts due to historical land use change. This established the need to map and assess all impacts throughout the entire value chain. Thereupon, we followed a practical approach to define the actual boundaries of responsibility: what is existing methodology, is data available, is there stakeholder support, what are the costs, where do the biggest impacts occur, what is the response of supply chain partners, etc.

The term 'societal consensus' was often put forward in the BioCom discussions on supply chain responsibility: the compensation plan must be 'marketable' to key stakeholders amongst which are critical NGOs. So the company has to come forward with a practical approach to satisfy the demands from critical stakeholders while at the same time feeling itself comfortable with respect to the outcome.

Dilemmas

Irrelevant of the good intentions of a company, in practice it comes down to feasibility: could the impacts be assessed (quantitatively and/or qualitatively) and to what extent is it feasible for a company to carry the (historical) biodiversity burden caused by the entire supply chain? It remains difficult to decide how the boundaries of responsibility for supply chain impacts in principle should be dealt with. In practice, this depends on issues such as:

- power, influence and impacts in the supply chain
- expectations by stakeholders
- marketability of the compensation suggested

- costs involved and opportunity to incorporate any costs in the price
- cooperation of supply chain partners

Most companies will not be capable of compensating for all losses throughout the supply chain. Should companies be pressed to take up this matter with their supply chain partners or could NGOs and governments find new ways to approach this matter on a higher level? A key topic to deal with should be the responsibility and accountability of third parties such as consumers and governments; how can they be engaged and stimulated to take their part of responsibility?

5.2.4 Like-for-like target

[relates to section 3.3.6]

'Like-for-like' is a compensation goal that generally strives for a compensation outcome that is similar to the biodiversity lost due to business activities, created in the same geographical area and habitat type.

Relevance of the theme

Many stakeholders favour a 'like-for-like' goal in biodiversity compensation projects. While it is understandable that there is a genuine wish to restore what has been lost and efforts should be undertaken to do so, the dynamics of ecosystems in time and space must be taken into account. Ecosystems are changing over time and space due to changing biotic and a-biotic processes, which could in the end cause compensation outcomes to deviate from the ones aimed for. The most a company can do via the implementation of its compensation plan is to create an environment with conditions that maximize the dynamic nature of ecological processes.

Moreover, the 'best conservation outcome' may be a more worthy target in some cases and perfectly justifiable towards stakeholders. 'Unlike-for-like' solutions could sometimes create much higher biodiversity gains and show more additionality. They could address (national) conservation priorities and/or conserve critically endangered ecosystems and species. The danger of a broad application of the term 'best conservation outcome' however is that it may lead to companies searching for the easiest and/or cheapest compensation options rather than assessing local opportunities and needs. Furthermore, it can lead to the degradation of certain ecosystems that are more difficult to restore and ecosystem services that are being overexploited and not maintained or gained in another place.

BioCom experiences

BioCom-participants had the intention to stick to the 'like-for-like' principle, though finding practical solutions on the ground sometimes forced companies to leave the principle behind. A circumstance, for example, was the lack of suitable, nearby land that enabled like-for-like compensation. A reason for adopting an 'unlike-for-like' approach could be the analysis of cost versus benefit showing that the same efforts deliver more biodiversity gains elsewhere. But when compensation activities loose almost every visible, direct link to the impact, it is difficult to market the plan to stakeholders. Transparency is essential in this respect.

Approach chosen

We adopted the approach that 'like-for-like' and 'within similar geographical region' should be the main goals, given our preferred outcome of 'no net loss'. No net loss implies that the biodiversity gained as a result of the compensation efforts (i.e. magnitude, quality and quantity) is equal to the biodiversity lost due to business activities. In reality no two hectares are ecologically identical and therefore it is impossible to ensure that compensation benefits are completely equivalent to the losses. The most direct means of establishing equivalence is to compensate with the same ecosystem. This is often easiest to achieve if the geographical distance between the impact and the compensation area is limited, since the chance on environmental similarity (from soil type to vegetation structure) is higher. Given the local use of ecosystem services and the social impacts of biodiversity loss, we considered this the most desirable option and used it in our project.

We made sure that deviations from the 'like-for-like' principle were well argued in the compensation plans – explicitly showing the biodiversity gains or

practical impossibilities – and discussed with stakeholders for their consent.

Dilemma

The dilemma is the like-for-like goal / best conservation outcome versus the aim to develop a prescribed methodology on compensation. There is no science base for arguing in general which option should be followed. Apart from this, stakeholders' views may differ from those held by the company, as expectations are different. This influences the direction of the compensation as well.

5.2.5 Additionality

[relates to section 3.3.7]

Additionality is an important criterion, and refers to the gains for biodiversity deriving from compensation activities that have taken place. They should be additional to gains already being delivered thanks to (planned) interventions by other parties, such as governments and NGOs.

Relevance of the theme

Additionality is a key issue that should be adhered to when drawing up compensation plans to establish credibility and support.

BioCom experiences

A critical comment to compensation is that it could replace biodiversity-friendly activities that would otherwise be carried out by other parties. Example: a company supporting the purchase of a Natura 2000 area that would otherwise be financed by the government. Additionality needs to be proven if the company wishes to obtain stakeholder support for compensation plans. It is essential to establish that the biodiversity gains would not be achieved without the intervention of the company. BioCom participants agreed that this can also be the case if biodiversity under threat is being protected (avoided loss).

Approach chosen

There is a need to ensure that compensation measures provide for something additional to existing or planned measures to conserve biodiversity. The current quality and quantity level of the biodiversity in question is not decisive in this respect. We agreed that additionality can be demonstrated in areas with low or degraded biodiversity that are given a boost by the compensation measures also in areas with a high biodiversity value where it can be demonstrated that without interaction there is a risk of biodiversity loss or degradation.

Dilemmas

Is supporting the management of an existing nature reserve considered an additional biodiversity profit or a pervert mechanism? Supporting farming methods leading to biodiversity improvement– is that an additional biodiversity benefit or an exploitation of market chances? Is it preferred to invest in a degraded area or in the maintenance of an area with a high biodiversity value? These dilemmas require further in-depth discussions with stakeholders and will generally be decided upon on a case-by-case basis. It would be helpful, though, if key stakeholders – such as international nature conservation organizations – would declare how additionality in their view should be interpreted and put into practice.

This dilemma can be linked to the discussion on 'like-for-like' versus 'best conservation outcome' when choosing the best compensation option. The extent of additionality can be decisive for the selection of compensation activities in this argument.

5.2.6 Perpetuity of compensation

[relates to section 3.4.4]

It is often thought that compensation will 'automatically' be established in perpetuity, but this calls for legal and financial assurances to secure site tenure, restrict harmful activities, support long term management and monitoring, and cover contingency and remedial actions in the event of compensation failure.

Relevance of theme

Even though there are no guarantees that biodiversity will develop itself as planned, nor assurances about the lifespan of the company, it is important to set conditions for the best possible outcome. This entails inter alia defining the period of time during which (and how) the compensation area is guarded against future negative impacts.

BioCom experiences

Different approaches have come forward to secure the duration of the compensation for the longer term (permanence). One approach has been to link up with an existing fund that is driven by recognized global stakeholders. Another approach has been to liaise with all key supply chain partners to search for support. A win/win situation for biodiversity and stakeholders was aimed for to ensure biodiversity support for the longer term.

Approach chosen

The companies involved sought options that contribute to the probability that compensation will last as long as possible. It was considered important to indicate how long term results are to be realized for each of the different pressures that are compensated, and to create support with stakeholders. Support from local communities living in or depending on the compensation area is essential, especially in areas of political and/or social instability. This is often too difficult for a company to organize itself throughout the supply chain; support from supply chain partners, governments and/or NGOs is needed.

Dilemmas

The following dilemmas were encountered:

1. Minimum term

Should each compensation effort be undertaken for a minimum amount of time? This idea could be supported by the thought that it takes time for biodiversity to develop/restore. But is this realistic to demand in the case of voluntary compensation? The minimum period (for compensation) should perhaps at least be the time that the company is operating in a certain area (concession period) or the duration of a sourcing contract.

2. Ending of activities

Is the end of the company's activities automatically the end of biodiversity compensation? This is not entirely logical when the impacts on biodiversity remain present for some more time. However, a compensation area would no longer be needed when the ceasing of activities has led to a full restoration of the production location. To prevent the risk that the company runs out of funds when biodiversity impacts still occur, it could be agreed beforehand that a deposit is made for the possible compensation. Moreover, in a possible take-over of activities, the compensation commitment should be part of the deal. A further option is to draw up an agreement with a recognized nature conversation organization that owns and manages natural areas. An agreement could be that the company buys the area and pays the management fee for e.g. 10 years and subsequently hands over the area free of charge to the nature organization.

3. Government involvement

Most companies have a shorter lifespan than it takes for (degraded) ecosystems to be restored. It is questionable whether long-term biodiversity gains following compensation can be assured without proper frameworks being set by the government, particularly on land use planning. National/regional development plans should indicate that a certain area is dedicated to nature conservation and sustainable resource use. On the other hand, compensation plans could link up with existing nature goals in the compensation area to gain support on governmental level.

5.2.7 Transparency

[relates to section 3.4.5]

Transparency refers to the openness shown with respect to the input, motivations and results of the compensation plan.

Relevance of the theme

Voluntary biodiversity compensation is a new and difficult topic for which no general guidance exists. Even stakeholders open to the idea, might be suspicious about the company's intentions and the tangible outcome. Being transparent is therefore essential for mandatory compensation.

BioCom experiences

It was generally recognized and supported by all BioCom participants – governments, companies and NGOs – that transparency is a condition for any compensation scheme to be acceptable (and a key element of corporate social responsibility). It is about sharing knowledge and ensuring insights in

the reasoning behind the decision to compensate and about the shape that is given to compensation. It shows the involvement and responsibility of companies and their concern about the production and origin of their products. The disclosure of relevant information on purpose, activities, scale and timelines of the compensation helps stakeholders to understand the risks, impacts and opportunities.

Approach chosen

Voluntary compensation is not set according to a fixed set of rules. Many steps in the process will have to be decided upon on a case-by-case basis. Transparency can be achieved throughout the development and implementation phases of the compensation plan through reporting, proper stakeholder engagement and communication activities. It is essential for allowing stakeholders to obtain the necessary data and insights, and create support for the steps taken.

It was recognized that transparency is essential but it cannot justify the choices that are made. 'As long as the company is transparent in its choices, the chosen compensation is acceptable as well' may not be the most successful attitude. Companies are challenged to not over-exercise a pragmatic approach in this complex field of work.

5.3 Assessment

5.3.1 Pressures on biodiversity arising from business activities

[relates to section 3.3.2]

Any type of business activity exerts pressure on biodiversity. There are two categories of pressure:

- One that includes pressures arising from the use of natural goods and services for production processes. Input examples are land, raw materials, fresh water and energy.
- One that comprises of pressures on biodiversity due to the by-products of production processes such as emissions, waste, radiation, light and noise.

Relevance of the theme

It is necessary to map biodiversity pressures to decide upon the extent of compensation. Boundaries need to be drawn in order to define such pressures in two ways:

- An identification of the business activities that are to be taken into account: what is within and what is outside the scope? Decisions can be based on the importance of certain activities for the company's financial turnover, or the expected impacts on biodiversity of certain processes or product, for example.
- The extent to which the pressures are taken into account: e.g.is only the effect of the use of chemical pesticides taken into account or is the production of such pesticides taken into account as well?

One has to know where and which pressures are generated by supply chain activities, before the business processes can be assessed for possible ways of reducing them to the level of ALARP[21] by taking mitigation measures (see section 3.4.1, mitigation hierarchy).

BioCom experiences

When identifying the pressures generated by the business activities of the companies involved, we experienced the following:

1. A framework is necessary to help the desired data on pressures in a consistent and transparent way; we used a very helpful input/output diagram that we developed for BioCom.

2. When discussing the pressures that arise as part of the business activities, we agreed upon a boundary defining what to include and what not, for subsequent data collection. The effects of the use of capital goods were included, but not the production of those goods. For example, the use of chemical pesticides was considered to be part of the input/output inventory, but not the impacts of the actual production of the pesticides. Similarly, the CO_2 emissions from road transport have been taken into account, but not the impacts related to the construction of national highways or truck production. Collecting data –

21 ALARP stands for As Low As Reasonably Practical and is the level of cost-effective pressure reduction.

comprising quantitative and qualitative data on current pressures – appeared to be a difficult task: companies generally do not have a central registration of their pressure sources or a risk register. The business participants also considered compensation for negative impacts on biodiversity elsewhere in the supply chain thus making data collection extremely difficult. Places of production are sometimes not even known. Although in the end not all data may be used for the compensation plan, this qualitative and quantitative overview is essential for companies to be able to base it on solid ground what the biggest biodiversity pressures are. This is important for the (external and internal) marketability of chosen mitigation and compensation measures.

3. Although the various pressures on biodiversity justify the broad approach towards biodiversity compensation, it could discourage a company to start with this topic. As a comparison, only compensating for CO_2 emissions is a much easier step to take for companies.

Approach chosen

The Millennium Ecosystem Assessment (MEA, 2005) distinguishes the following categories of pressures or direct drivers of change:

- changes in land cover and use
- species introduction or removal
- external inputs (e.g. use of fertilizers, pesticides)
- harvest and resource consumption (e.g. fisheries, forestry)
- climate change

These categories are more or less similar to the ones we have used. In our view, though, climate change is not a category but the consequence of emitting greenhouse gasses into the air. Mitigating those emissions is within the capability of a company but the climate change effect is not.

We grouped the pressures into four broad categories (to later translate into a footprint) and as such we identified: land use - emission of CO_2 (equivalents) - water use – miscellaneous/disturbance. As referred to above, we decided to limit the identification of pressures to the immediate business activities. Derived activities such as the production process of pesticides were not included in our analysis, neither were the pressures resulting from that. We identified the pressures on biodiversity throughout the supply chain of each of the participating companies and their products under consideration, although it appeared not an easy task getting the required quantitative data.

Dilemmas

How could biodiversity compensation link up with existing compensation schemes such as those introduced for climate neutrality? CO_2 compensation schedules are widely adopted while water compensation models are also being developed. It is not clear at this stage where and how the different initiatives could be brought together to develop a model for companies to compensate for the different biodiversity pressures. A first step may be REDD+: Reduced Emissions from Deforestation in Developing Countries. It is a CO_2 compensation schedule with a potential to benefit biodiversity. Moreover, there are some areas of development, for which no initiatives have been started at this stage. No compensation is yet designed, for example, for the pressure of introducing exotic species to the area or even to the nation.

5.3.2 Pressure-specific information

[relates to section 3.3.2]

Qualitative and quantitative data have to be collected on pressures identified in order to enable the assessment of the actual and/or potential consequences of those pressures for local, regional and sometimes global biodiversity.

Relevance of the theme

Pressure-related data serve as the basis for the mitigation process to enter into and for compensation measures to be taken.

BioCom experiences

When describing the pressures generated by the business activities of the companies involved at a quantitative and qualitative level, we experienced the following:

1. Lack of data because a company does not register the use of resources and/or emissions and discharges, - often because the resources are 'free' or impacts are not considered important.

2. Lack of consistency in data because a company does not centrally aggregate data on the use of resources and/or emissions and discharges; consequently similar data are registered differently throughout the company.

3. Lack of specific data because of a shortage in knowledge with respect to the origin of the product or the location / application of certain production processes, especially in case of activities up or down the supply chain over which the company involved does not exert control.

Companies invested quite some time to find the actual data and, where data was absent, came up with appropriate alternatives or accepted that it was not possible to gather data for some pressures. Generally, data on land take were readily available whereas finding data on effluents or waste appeared more challenging.

We learned that it makes sense to weigh the efforts of data collection for certain pressures (and the costs involved for those efforts) with the possible risks imposed on biodiversity by those pressures: most efforts and costs should be spent on getting a clear picture of the biggest threats to biodiversity throughout the supply chain in question. Moreover, it was clear that companies gathering pressure information throughout the supply chain as part of their ongoing environmental management system have an advantage in this data collection process. For future data collection, it would be helpful to define the pressures on which they want to have information and confront suppliers and /or clients with that request.

Finally, we learned that the use of global models, literature data, etc. in combination with local, pressure-related data to the greatest possible extent gives the best possible quantitative picture of the pressures on biodiversity.

Approach chosen

There was no discussion with respect to the relevance of the theme. We used the input/output diagram to serve as the basis for data collection. More important was the discussion how the lack of data should be dealt with. Location-specific data were preferred, in absence of which proxies or default values were used. We organized this in the following way:

1. Lack of specific data was captured by referring to or making use of data considered to be the most accurate for the specific case (e.g. default values derived from literature). Example: the BioX Group did not know the exact location of palm oil production though it was known that it would be a RSPO certified plantation. Consequently, it was assumed that the production location would resemble an average RSPO certified plantation. General input and output data of such a plantations are known and have been used in this case.

2. In case of limited available local data, existing data have been extrapolated to take into account the entire production in the supply chain. Example: data on timber harvested and associated pressures in Wijma's own licensed forest reserve in Ghana were extrapolated to capture all biodiversity impacts of the Wijma saw mill in Ghana.

3. Data on specific topics were not taken into account when we concluded on a risk-based approach that their impacts on biodiversity were low. Example: in the case of the Kruidenier Groep, the volume of detergents used for cleaning the cattle transport trucks was not known. Given applicable legislation requiring biodegradable detergents, we concluded that the impact of those on biodiversity would be limited and therefore there was little need for precise data. Consequently, no costs and efforts were spent on finding out the exact volume of detergents used.

5.3.3 Indirect effects

[relates to section 3.2.4]

Company activities can cause impacts on biodiversity. These are referred to as direct impacts. As a result of the company activities, spin-off effects can happen that also have a negative influence on biodiversity. Such effects are referred to as indirect effects. Examples of indirect effects are leakage (i.e. displacing threats to biodiversity somewhere else) and illegal forestry or hunting as a result of opening up previously inaccessible areas for the benefit of economic activities (e.g. due to the construction of roads)[22].

Relevance of the theme

Indirect effects occurring often result from a combination of political and social circumstances, such as a lack of local land use planning, poor legal enforcement or poverty. A company must decide whether or not indirect effects are taken into consideration in the compensation plan.

BioCom experiences

As a matter of fact indirect effects on biodiversity resulting from company activities can be much bigger than the direct impacts. Therefore, many NGOs and authorities feel that these deserve attention in compensation plans. Companies pointed out that they are responsible for their own activities but that the occurrence of indirect effects should be dealt with at a higher level (e.g. governments, international conventions). Although this may be very true, it should be noted that stakeholder attention for indirect effects is increasing and a higher responsibility is expected from companies in this respect in the future. Financial institutions, for example, increasingly demand that their clients incorporate potential indirect effects in their social and environmental assessments, asking companies to analyze the risks in the context of 'areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location'[23].

BioCom discussions on the occurrence of indirect effects were often linked to the discussion on supply chain responsibility. To which extent can a company be held responsible for indirect effects taking place? Although mostly not responsible from a legal point of view, ethical motives can inspire a company to take indirect effects into account. It was discussed, though, that even if companies wish to compensate for the burden of indirect effects, it is generally not feasible from a financial point of view. In any way, from an operational point of view, it appeared to map the degree of active indirect effects.

Approach chosen

Although opinions differed at first, it was agreed within BioCom that companies cannot be held responsible for either indirect effects or their compensation. This was primarily considered a responsibility and governance role for the government. However, given the potentially high negative impacts of indirect effects, it was noted that the least a company can do is to be aware of possible indirect effects, and discuss these with the stakeholders engaged. It serves a company to take mitigation measures to the furthest extent possible to prevent them from taking place. Moreover, it was decided that the potential occurrence of indirect effects would be addressed when developing and implementing compensation plans and precautionary measures would be taken.

5.3.4 Mitigation measures

[relates to section 3.4.1]

Mitigation measures comprise:

- avoiding negative impacts on biodiversity from taking place, e.g. by expanding or starting up activities in existing industrial areas;
- moderating negative impacts on biodiversity occurring, e.g. by constructing animal crossings;
- reducing the occurrence of negative impacts on biodiversity, e.g. by minimizing pesticide use.

22 A second type of indirect effects concerns impacts on biodiversity resulting from activities of supply chain partners. It has been a key focus of BioCom to incorporate this kind of effects in the company compensation plans. This type of indirect effects is not discussed in this section.

23 International Finance Corporation, Performance Standard 1, section 5: http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/pol_PerformanceStandards2006_PS1/$FILE/PS_1_SocEnvAssessmentMgmt.pdf

Relevance of the theme

Searching for potential mitigation measures prior to compensation taking place has been set as a condition within BioCom and is generally adhered to in any voluntary or legally binding compensation initiative. The application of mitigation measures have therefore been discussed extensively in BioCom.

BioCom experiences

Data collected on biodiversity pressures served as input for discussions on mitigation measures. Which pressures can be prevented or reduced? What is the driver for companies to go beyond law and legislation and mitigate as much as possible? Answers depended on the needed licence to operate, technical possibilities and/or expected societal support. This has been discussed when assessing opportunities for companies.

Considering the fact that BioCom deals with supply chain compensation, other important questions were: does it make sense to discuss mitigation measures when the origin of the product is unknown and/or there is no influence on the behaviour of supply chain partners?

We experienced that a case-by-case approach and due stakeholder consultation are to be applied to determine the set of mitigation measures.

Approach chosen

The BioCom compensation principle refers to *residual* negative biodiversity impacts after appropriate *prevention and mitigation measures* have been implemented. The first step taken by companies was therefore the application of the mitigation hierarchy approach (section 3.4.1).

No general rules can be set beforehand concerning the extent to which mitigation should take place, beyond the minimum requirements of laws and legislation. A limitation for further mitigation measures could be the cost level – for example too high in comparison with the benefits they bring. Or there could be limits in the technical field. Within BioCom, there was no room to have potential mitigation measures checked or investigated by external experts. Although it was not the most desirable result, due to our approach the companies ultimately decided whether or not the potential mitigation measures were feasible and/or realistic. Input for their decisions was obtained from other BioCom participants and the two Fish Bowls (organized within the scope of BioCom and attended by external experts and stakeholders). It was made very clear, though, that many activist NGOs regard compensation as a cheap, easy way out, to justify unsustainable activities. A thorough application of the mitigation hierarchy in cooperation with stakeholders is therefore needed.

Dilemma

Mitigation should take place to the maximum extent possible. The answer to the question 'Who decides when 'sufficient' mitigation measures have been taken and compensation may be considered a next step to offset the remaining impacts on biodiversity?' is very subjective. Mitigation measures can – technically speaking – almost always go beyond the level taken. Cooperation with key (and critical) stakeholders, experts and transparency are essential in creating proper support.

5.3.5 Currency biodiversity footprint

[relates to section 3.3.4]

A currency in this context is the unit to quantitatively express the biodiversity effects of activities.

Relevance of the theme

Data on biodiversity pressures created by business activities needed to be translated into an impact on biodiversity (the biodiversity footprint) in order for the company to know how (much) to compensate. This footprint needs to be expressed in a certain currency.

BioCom experiences

The input/output diagram to list the supply chain pressures on biodiversity provided a wide variety in pressures expressed in different units (e.g. hectares, litres, CO_2). The challenge was to come up with a single biodiversity currency, e.g. hectares lost (of natural habitat), to turn all different pressures into a quantitative measure. The idea to add all biodiversity pressures and calculate subsequent impacts into one footprint currency was desirable but not feasible. The pressures appeared very difficult to compare and

aggregating impacts therefore became too abstract. For example, the effect of CO_2 emissions could be translated into 'hectares lost' through a certain calculation methodology that connects global warming to the degradation of biodiversity in the remote future (say 2050). However, there are several large uncertain ties involved. Moreover, marketability and accountabilit are distinct parts of the compensation plan. This hypothetical future loss does not add to acceptance.

Given the current methodologies, we experienced that compensation was best madeon the basis of the separate pressure groups identified. It is plain that any measure offering benefits for more than one pressure group was welcomed.

Approach chosen

Determination of a company's footprint is only in the beginning of its research period. It is clearly a point that deserves attention and further research. We decided to categorize biodiversity pressures in the following four explicit groups and subsequently calculated the footprint of each of them:

- *Land use change*
  The currency used to express the footprint is hectares – specific and easily measurable.
- *Emission of CO_2 (equivalents)*
  The currency used to express the footprint is tons CO_2 – easily measurable, but diffuse.
- *Water use*
  No currency could be found to express the biodiversity impact resulting from water use, unless complicated geohydrological models would be applied that could identify the areas affected by water consumption. It would be going too far for BioCom to apply this science throughout the supply chains involved. Within BioCom, water use pressure in the different parts of the supply chain has been assessed on the basis of global water stress models.
- *Miscellaneous*
  This group of pressures comprises pollution, (over)fertilization and emissions other than CO_2 for example. The footprint differs for each of the different aspects. We did not manage to find currencies to express the same.

Currently, only the biodiversity footprint following land use change and CO_2 emissions can be expressed in a currency. Apart from that, the use of different currencies in expressing the biodiversity footprint makes it impossible to truly compare the different pressures. Also it makes it difficult to assess which biodiversity impacts are the most significant.

An educated guess could serve to allocate any kind of footprint to the categories 'water use' and 'miscellaneous'. The land use footprint (hectares) could, for example, be increased by 10% to cover water use. This could serve as a practical solution/alternative in replacing long and difficult calculation processes and be more secure that a no net loss situation will minimally achieve. However, experience taught us that correction factors are rather just educated guesses than based on science. Another option for these pressure categories could be that extra attention is given to seeking opportunities to mitigate them.

It might be justified to say that the majority of impacts are being covered when looking at land use change and CO_2 emissions (80/20% rule). The Netherlands Environmental Assessment Agency suggested, for example, that the annual biodiversity impact of pesticide use on agricultural land is often thought to be nil compared to the one-time impact resulting from deforestation that may have taken place to convert the natural area into a production area. But one should remain cautious and accurate, and such statements should be underpinned. In the case of pesticide use, for example, impacts occurring depend on the level and type of pesticide use, water drainage, receiving waters, etc. A sensitivity analysis (such as in a Life Cycle Analysis) can perhaps deliver the justification desired.

5.3.6 MSA methodology (calculating the land use footprint)

[relates to section 3.3.4]

The Netherlands Environmental Assessment Agency built a database[24] upon which an MSA can be ascribed to an area. MSA, a composite index for biodiversity, stands for Mean Species Abundance = the abundance of selected species that characterize a specific habitat. The MSA methodology was used within BioCom to express the land use biodiversity footprint. An MSA (values range from 1 –optimum biodiversity level, to 0 – no biodiversity left) indicates the level of biodiversity change over the years in comparison to the naturally present biodiversity.

Relevance of the theme

Land use for economic activities is an important contributor to the global loss of biodiversity. It is therefore a significant aspect to take into account when developing biodiversity compensation plans. For that, it was necessary to come up with a methodology that enabled BioCom to calculate the land use footprint throughout the supply chain.

BioCom experiences

Given our limitations – the absence of local field data of today's situation, production locations not being known and lack of field data on the 'original' biodiversity prior to land use conversion – the MSA methodology was considered the best option for BioCom. Still, the MSA methodology was under discussion, since it is coarse and general. We experienced that the MSA methodology delivers a good starting point for assessing the land use footprint, but should be combined with location-specific, on the ground data for better results. Such location-specific information may include information on the habitat type and species information (such as species richness, level of endemism, Red List species, etc.).

The methodology assumes that land being converted still retains a certain level of biodiversity. To compensate for the MSA lost, the MSA level of other areas could be increased. We learned that this is an abstract theory that must be used sensibly. The level of rareness of ecosystems and species is not incorporated in the MSA methodology. Simply increasing the MSA of other areas is not sufficient; the same habitat type preferably ought to be taken into account. Furthermore, there is no difference between good and bad land management within the MSA methodology. The management categories recognized are 'extensive' and 'intensive' (categories which are too broadly defined).

From our experiences we learned that for better implementation:

1. the MSA methodology should be improved (e.g. refinement of categories, inclusion of additional pressures);
2. the MSA model approach should be combined with location-specific information;
3. the MSA methodology needs to be upgraded or extended to a level that it better suits the needs of biodiversity compensation on company level;
4. guidance needs to be drawn up as to:
   - Which local data are necessary?
   - How should these be obtained (e.g. engaging local communities, local knowledge institutions and nature conservation NGOs)?
   - How can local data be combined with the use of the MSA methodology?

Approach chosen

Global models and regional knowledge can give indications with respect to the plausible local situation, but can never generate the local data wished for to truly determine the order and magnitude of the compensation. The best approach for defining the land use footprint would be to (1) assess the biodiversity present (species and ecosystem services) before activities are to be undertaken to set the baseline, for several years to eliminate changes due to system dynamics; and (2) monitor the level of biodiversity present over the years. Unless relevant impact assessments were carried out prior to the activities taking place, it takes a lot of effort to truly determine the local biodiversity and rendering of ecosystem services that were once there at the production locations throughout the supply chain (NB: one could perhaps

24 The database is built upon literature data derived from hundreds of scientific publications in respect of biodiversity impacts measured, climate zones, production methods, etc.

refer to similar intact natural systems to assess the loss). Within BioCom it was questioned if it is tempting for companies to undertake voluntary supply chain compensation when it requires this amount of field work (and related costs!). For the compensation plans developed the chosen MSA methodology appeared fit-for-purpose to map the land use effect on biodiversity throughout the supply chain, both current and historical. The size of the area taken up by specific business activities was combined with the MSA index describing the level of biodiversity change over the years. Any local data present or an educated guess could have been used to adjust the MSA result to make it more applicable for the specific production location under review. This has not been done due to a limited timeframe.

5.3.7 Compensation of CO_2

[relates to section 3.3.4]

Greenhouse gas emissions are an increasing pressure impacting on biodiversity. BioCom therefore also addressed the compensation of any CO_2 emissions (or their equivalents).

Relevance of the theme

CO_2 emissions (or their equivalents) have an impact on biodiversity through the climate change it they cause. Some species profit from global warming, some do not. Global models show that the rise in temperature forecasted could bring species to the edge of extinction. It therefore makes sense to include CO_2 compensation when drawing up biodiversity compensation plans.

BioCom experiences

Global models can establish a link between CO_2 emissions, global warming and future biodiversity loss and express this link in 'natural hectares lost'. There are several significant uncertainties involved with these models and, moreover, they are not easily applicable at company level, i.e. when looking at the quantity of tons CO_2 emitted by a certain supply chain. The result is a few hectares that would have to be compensated. But how? Which ecosystems? To compensate for the emitted CO_2, it appeared to be easier and more understandable for the stakeholders to connect to existing CO_2 compensation schedules.

Approach chosen

Within BioCom, different biodiversity pressures have been expressed in tons of CO_2, the main factors being land use change, fossil fuels use and methane emissions (e.g. CH_4, resulting from livestock activities). The total quantity of CO_2 emissions (and their equivalents) was calculated based upon output in each of the supply chains involved. The companies plan to use existing CO_2 compensation methods and schedules for compensation. An advantage is that these schedules are known to stakeholders and therefore easy to explain. Downsides are that a relationship with the place of impact is difficult to establish and biodiversity benefits are not always clear. With respect to the latter, specific attention is required to ensure that biodiversity can gain from the chosen CO_2 compensation method.

Dilemma

A dilemma discussed was: is it marketable to stakeholders to compensate for land use and CO_2 (equivalent) emissions together through one compensation effort? This concerns, for example, the restoration or upgrading of natural areas as a result of which CO_2 sequestration takes places (e.g. by planting trees). No clear decision has been taken at this point.

5.3.8 Compensation of water

[relates to section 3.3.4]

Compensation of water refers to measures that offset the negative activities of businesses on biodiversity that is dependant on water sources.

Relevance of the theme

Many economic activities require water. It is foreseen that desertification becomes more and more a reality for an increasing number of places due to climate change and overexploitation of fresh water resources. Fresh water shortages affect biodiversity, though on a very local level. Local data are necessary to measure the true impact of economic activities on the water balance and develop subsequent compensation measures.

BioCom experiences

No water footprint models are available as yet to translate comprehensively the footprint of an individual company or a supply chain into units of affected biodiversity. There are some calculations at this stage exploring the relationship between (virtual) water use and water stress[25], but these are at a general level. Moreover, they would only be of use in future biodiversity compensation plans if they offer the possibility of linking the use of water to impact on diversity. There are certain geohydrological models that could identify the areas affected by water consumption. However, these were too complicated to use for supply chain compensation in BioCom, though more time would have allowed investigating the use of these models in specific parts of the supply chain on a risk-based approach.

Due to a lack of proper alternatives, BioCom used the national water stress level of each of the production countries in the supply chains involved – both now and in 2030 – to assess to what extent these countries experience water stress (i.e. a lack of fresh water). It was recognized that water stress can occur locally and create adverse biodiversity impacts, can also occur in countries that do not experience water stress on a national level.

25 van Oel, P.R., Mekonnen, M.M. en Hoekstra, A.Y. (2009) The external water footprint of the Netherlands: Geographically-explicit quantification and impact assessment *Ecological Economics* 69, 82-92.

Approach chosen

BioCom used national water stress levels for 2000 and 2030 to assess whether or not the area of production is or would be in a water sensitive country. This proved not to be the case for any of the production locations. It was recognized that the approach we used is too global to be of true use for companies. Water use is one thing, compensation is another. The idea of what water compensation would look like has not yet been formed. Compensation in this field is an unknown area; when searching for water compensation methods it has at least to be ensured that biodiversity gains take place.

5.3.9 Compensation of miscellaneous pressures

[relates to section 3.3.4]

The biodiversity footprint has been expressed in four categories: land use, CO_2 (equivalent) emissions, water use and miscellaneous. The group 'miscellaneous' deals with all impacts on biodiversity that cannot be allocated to any of the other three groups. Examples of such impact sources include ecotoxicity due to the use of pesticides or the occurrence of heat.

Relevance of the theme

To get a full picture of the biodiversity footprint of a company, all different pressures on biodiversity need to be mapped and taken into account.

BioCom experiences

It has been impossible to translate the pressure group 'miscellaneous' in any kind of currency suitable for compensation. The pressures in this group were benchmarked against the pressures in the other groups. For all companies it was believed that the miscellaneous pressures were relatively small compared to the others (land use, CO_2 emissions and water use). This was taken into account when drawing up compensation plans.

Approach chosen

Currently, there are no calculation methods to map accurately the biodiversity footprint of the miscellaneous pressures. We decided that the first and most important step for the pressures in this group are mitigation measures, such as a limitation of chemical pesticide or fertilizer use, the reuse or recycling of waste or a reduction in heat production. Production processes might need to be changed to realize this.

Another option we followed was to enhance the compensation efforts for the other pressure groups (for example, 10% extra in compensation hectares through the use of a correction factor) as a way to incorporate the miscellaneous effects (see section 3.3.5). Financial feasibility was a pre-condition, especially given the discussions on historical loss and supply chain responsibility.

5.3.10 Ecosystem services

[relates to sections 3.2.1 and 3.3.6]

Biodiversity is a key to the functioning of ecosystems and the delivery of ecosystem services. And there is no company that would not be dependent on such services that form the basis of our existence and wellbeing. Ecosystem services provide our fresh water, food, nutritive cycle, climate regulation, sources of recreation, soil fertility, air quality, etc.

Relevance of the theme

The topic of ecosystem services is complex given the fact that there is a strong liaison with local communities and their dependency, use and impact on the same ecosystem. Moreover, there is a potential difference in effect on local communities versus effect on biodiversity. For example, if biodiversity in the region does not experience any water problems as a result of current economic activities that lower the level of the groundwater table, this does not automatically mean that the local community will not experience consequent water problems now or in the future. Ecosystem services create a specific dimension that should be separately addressed in compensation plans, both in the impact area and in the compensation area. This is even more important when current or recent impacts are concerned.

BioCom experiences

We learned the following:

1. Mapping the effects of activities on the delivery of ecosystem services is time-consuming and expensive, if at all possible (i.e. the places of activities are not always known throughout the supply chain). It requires research on the ground to identify the local ecosystem services and who benefits from them. This research could not be carried out during BioCom.

2. Historical impacts on ecosystem services can hardly be assessed. BioCom was dealing with compensation of existing activities in production areas that were perhaps converted dozens of years ago.

3. Annual impacts on ecosystem services as a result of current activities often seemed acceptable for known production locations given stringent environmental conditions (e.g. on the level of emissions) and mitigation measures implemented.

Moreover, we experienced that guidance to companies (presently unavailable) as to how to deal with ecosystem services – both in the impact as well as in the compensation area – would be very useful. It would help companies to (roughly) quantify ecosystem services and to make an initial assessment to find out how relevant they are and how negative the impact is. Huge relevance and/or significant impacts could be reasons to do more detailed research on the ground for a specific service. This is something that is different in each individual situation. It could well be that a lack of detailed data is no barrier to address the problem. If communities face problems due to a disrupted water balance, for example, it may not be necessary to know the exact extent of the disruption. It could be sufficient to liaise with the locals to see how their future access to fresh water can be restored and ensured. Stakeholder engagement is a key factor in this matter. The guidance for companies should therefore also advise how companies can engage stakeholders in dealing with this issue.

Approach chosen

The loss of ecosystem services on the local level and any plans to cover this loss are important to address in compensation schemes. Social-environmental assessments on the ground are necessary: what are the relevant ecosystem services? How are they being used and by whom? Which impacts are identified? A good approach may be to liaise with the local people and to discuss what they might see as alternative sources of income or fresh water for example.

Within BioCom, however, the challenge of mapping the effects on ecosystem services could not identify the impact area for various reasons (explained above). However the maintenance of ecosystem services for local use will be taken into account for the compensation areas

(through stakeholder engagement), once the compensation plans will be executed.

Dilemma

Compensating for the loss of local ecosystem services is difficult. How can a company compensate local people, for example, for no longer being able to collect non-timber forest products in case the forest is cleared for the benefit of a production area? Even if compensation of ecosystem services happens in the vicinity - such as the restoration of a fresh water resource in the same ecological zone - it is often doubtful whether the compensation will truly benefit the local communities living in the impacted area who had access to the disturbed ecosystem services. Benefiting of ecosystem services is generally very location-specific.

5.4 Implementation

5.4.1 Compensation activities / options

[relates to section 3.4.2]

The activities that companies carry out to compensate for their negative impacts on biodiversity should cover those impacts that are current and/or historical, those that originate from their own activites and those created by supply chain partners, and those which are direct and/or indirect.

Relevance of the theme

The compensation plan shares the activities that are planned to be undertaken. In the development phase of the compensation plans, compensation activities which are considered satisfying, both for biodiversity and the company need to be identified.

BioCom experiences

Our experiences were as follows:

1. Compensation plans are most likely to be successful and supported, both internally and externally, when there is a link between the type and place of economic activities and the compensation activities. For example, a timber company – such as Wijma – replanting degraded areas. Connection and recognition are important.

2. A spiral of more and more biodiversity-friendly operating can be realized if a link is established between the compensation measures implemented to offset the negative impacts of one of the company's products on the one hand and other company products / services on the other hand. A positive spin-off can thus be created. An example is the compensation for CO_2 emissions by planting trees, the fruits of which can be traded by the same company. This is an opportunity assessed by the Kruidenier Groep.

3. Compensation activities can link up with biodiversity problems already existing in or around the impact area. In a country where biodiversity suffers from fragmentation, for example, the idea of establishing corridors between nature reserves could be embraced.

4. Consultation of (local) stakeholders is a key in the process of the selection of compensation options.

5. It is desirable to have an independent verification of the outcome/results of the compensation activities. Although the use of independent verification is attractive and results in market compensation, we discussed other options as well. Independent verification would require the development of criteria, a certification scheme and authorized auditors. The risk is that such verification is too complicated and expensive. Cooperation with recognized stakeholders may neutralize the lack of an audit.

Approach chosen

The multi-stakeholder approach of BioCom delivered the input and knowledge to identify compensation options and select the most appropriate ones. The companies involved are well aware that input from and support on the local level for the actual implementation of the compensation actions are still needed. This could not be organized during the time frame of the project.

Dilemma

Compensation is designed to achieve a no net loss situation. The answer to the question 'Are compensation actions acceptable and do they deliver a no net loss situation or even a positive contribution (when the compensation efforts outweigh the costs to biodiversity)?' is very subjective. Footprint calculations cannot deliver the desired, detailed results for the biodiversity compensation to guarantee producing a no net loss. A solution could be investing extra compensation to have better guarantees on 'no net loss'.

BioCom organized two stakeholder meetings in the Netherlands to share and discuss the steps taken by the companies involved to create well-founded compensation plans. However, companies have to be prepared for the potential suspicion of 'greenwashing'; the fact that compensation might be cheaper than mitigation measures, or the company 'just' found a licence to destroy tropical rainforest because it compensates. Any adherence to 'no go' areas should be best explained. Cooperation with key (and critical) stakeholders, experts and transparency is essential in creating proper support.

5.5 Management and reporting

5.5.1 Governing the compensation plan

[relates to section 3.4.3]

The governance of the compensation activities is about the question: 'who is in control with respect to the execution, progress and delivery of the aimed for results?'

Relevance of the theme

Drawing up a compensation plan includes a consideration of the different governing models of compensation. A company needs to assess – given its experience, capacity, time and budget allocated for compensation – which model is most suitable.

BioCom experiences

The companies wished to be truly involved with the execution of compensation activities to ensure that their intentions would be accurately translated into activities and that stakeholder engagement would be shaped according to their ideas.

Approach chosen

Biodiversity compensation is a relatively new mechanism that is in the process of being developed. Most compensation plans are being shaped on a case-by-case basis in cooperation with stakeholders. As far as the actual execution of these plans is concerned, we discussed four different methods:

1. the use of existing systems or initiatives to compensate for the company's impact (such as banking systems);

2. the outsourcing of the execution and management of the drafted compensation plan to a third party;

3. the organization of all aspects of the execution of the compensation plan, including stakeholder engagement, by the compensating company itself;

4. the setting-up of a new compensation system, e.g. a biodiversity compensation bank relating to the realm in which the company is active.

The companies decided which control mechanism suited them best in the course of the development of the compensation plans, for which input was gained from the buddy groups and stakeholder meetings. As a result:

- BioX Group BV focused on existing initiatives as the complex social and political circumstances in Malaysia make it difficult to organize the execution of compensation activities from the Netherlands.
- The Kruidenier Groep BV chose to organize the execution of the compensation activities on its own. The contents, planning and implementation of the compensation activities will take place in cooperation and consultation with supply chain partners and stakeholders, but the Kruidenier Groep remains in control.
- Koninklijke Houthandel G. Wijma & Zonen BV assessed different options: establishing forest plantations (self organised); and supporting protected areas (outsourcing). Wijma felt that more research needed to be undertaken before a decision could be made.

5.5.2 Stakeholder engagement

[relates to section 3.4.5]

Stakeholder engagement is about consulting people and organizations having a stake in the area concerned (both the impact and/or the compensation area) or in the activities of the company.

Relevance of the theme

The significance of the engagement of relevant stakeholders with the preparation and execution of compensation plans is generally acknowledged. Without stakeholder consultation, the setting up of a realistic and performable compensation plan is not considered to be feasible. It is important to create support for activities to be undertaken, but stakeholders also may contribute with input and ideas that the compensating party has not thought about. Specifically as far as the degradation of ecosystem services and the effects of biodiversity impacts on day-to-day living conditions are being concerned, local people may come up with different solutions than anticipated by the compensating company.

BioCom experiences

BioCom delivered the following experiences:

1 It has been advantageous to engage representatives from NGOs and the government directly from the beginning. They have specific capacities and networks and present different views. This increases creativity and support for compensation plans.

2 Entering into compensation requires quite some expertise. It is an expertise that is not always available within the company. Working with partners in this process is therefore advantageous.

3 Discussions on the value of biodiversity with stakeholders (social-economic, economic and ecological) are important especially as , not all questions with respect to biodiversity can be answered on a technical level (for example, the importance given to cultural biodiversity experience or the intrinsic value of biodiversity).

4 Stakeholder engagement: does it happen, does it happen enough and when should it happen? The general idea is that stakeholders should be involved during all phases: from the first ideas of compensation up to and including monitoring, to ensure support for the plans, to check feasibility, etc. This can, however, be a complex process, especially when the variety of opinions is large and opinions are conflicting.

We had extensive discussions on the start of stakeholder engagement. During which phase of the compensation ideas/activities should stakeholders be involved? Different views have come to the surface within BioCom:

- One view was to engage stakeholders directly /right of the beginning. Otherwise one might take the risk having to alter everything in a later stage due to new insights or a lack of support.
- One view was to draft the basis of the compensation plan prior to consultation. Once there are ideas about the direction of the compensation (e.g. as far as location or nature of compensation is concerned) these can be discussed with stakeholders.
- A last view was to only consider engagement in the implementation phase. Engaging stakeholders before can delay the process if they are not cooperative.

There was no general consensus as far as the timing of the engagement is concerned. In practice, the nature and frequency of consultation will vary, depending on the support for ideas and the feasibility of compensation plans. There may be a certain gradation in consulting stakeholders. For example, discussing and developing first ideas with some key stakeholders and extending this group when more contours and data about the compensation become known.

Approach chosen

BioCom participants supported the idea of due stakeholder engagement both in the impact as well as in the compensation area. The concept of biodiversity compensation and any ideas (together with their likely impacts) need to be explained and explored. The disclosure of information was considered essential in this process – not only on potential benefits but also on risks and potential adverse impacts resulting from compensation plans; self-evidently also taking socio-economic aspects into account. This approach offered the opportunity to connect compensation efforts with existing biodiversity initiatives and goals as well. Moreover, stakeholder engagement delivered insights in the different values attached to biodiversity by specific stakeholders. These insights are crucial when drawing up a compensation plan that is to count on sufficient support by stakeholders.

We projected a more extensive stakeholder consultation in our approach, also on the local level, but this turned out to be too time-consuming and complex. Companies are aware that this is still needed to create sufficient support and plan to do so in the implementation phase.

Dilemma

1. How to select stakeholders for engagement?
What are the boundaries for identifying stakeholders on the global, regional, local level? How does a company deal with stakeholders generally rejecting the concept of biodiversity compensation?

2. Local versus specific, regional versus global?
Are there different times to engage different types of stakeholder?

5.5.3 Costs

Generally, three types of costs can be identified when looking at biodiversity compensation:

- Development costs of compensation plan
- Costs for expertise, data collection
- Implementation, execution and monitoring costs

Relevance of the theme

Costs influence the proportions of the compensation plans. The financial means of a company decide the extent to which the different (pre-) compensation phases can be taken. For example, full tracking and tracing, location-specific data collection and compensation of all historical losses all require significant amounts of time and investments.

BioCom experiences

Costs appeared to be rather decisive in discussions about the implementation of compensation plans:

- whether or not compensation would be carried out;
- whether or not (or to which extent) historical loss would be taken into account;
- whether or not (or to which extent) the impacts of supply chain partners would be compensated;
- whether or not compensation costs could be incorporated in the sales price.

We decided to map all impacts in the most feasible way – including historical losses and supply chain impacts – and to engage with stakeholders to find out which impacts on biodiversity would be best first compensated.

Approach chosen

Given the importance of the economic part of compensation, we chose to pay due attention to this matter. Within the possibilities of the project, we tried to map the different costs, to allocate budget and time to activities and (where feasible) to liaise with supply chain partners about their role.

We realized that there are different financing models for compensation and spent time on thinking about which model fits best given the company's situation. A multinational company may be able to finance (pre) compensation activities with existing means at once, while a small-sized company may need to use ongoing cash flow to pay for them. At least, a cost benefit analysis is necessary to ensure that the biodiversity benefits outweigh the (economic) costs.

Dilemma

Compensation in the one area may be cheaper and creating more biodiversity gains than in another area (e.g. compensation activities in the south versus those in the west). To which extent is like-for-like prevailing in these cases?

5.5.4 Compensation claim

The compensation claim concerns the claim the company makes towards society as a result of its compensation activities.

Relevance of the theme

It is about communication on the intention of the compensation activities. This is an important aspect of compensation in order to create support, show transparency and explain activities (to be) undertaken.

BioCom experiences

There were some discussions about this issue, mostly between NGOs and companies. It concerned:

- the fear that companies would claim to be sustainable as a result of carrying out compensation activities;
- the fear that sustainability claims would be made speaking on behalf of the project group participants, thus suggesting that it was generally agreed upon that the company is now sustainable.

Approach chosen

Sustainability implies the striving for a situation in which processes remain capable to develop naturally with resources being plentiful and complete enough to respond to new conditions. The situation aimed for is not a status quo. The true concept of sustainability is not finite. It takes many steps to be and remain sustainable in the future. Compensation is one of these steps.

The BioCom approach agreed was:

1. Companies making claims make these on their own behalf. It is up to critical stakeholders to assess the validity of such claims.

2. When communicating, companies will try to imagine which values and ideas are attributed to compensation by the receiver of the message. The claim should be in balance with the contents of the compensation activities, and be as transparent and clear as possible.

3. Companies will liaise with key stakeholders about this issue prior to communication taking place and try to agree upon the claims the company wishes to make. This makes a company less vulnerable for negative response.

5.6 Conclusions and recommendations

This chapter provides in-depth insights in biodiversity compensation in the context of supply chain compensation. We have gained a tremendous amount of experience in dealing with supply chain biodiversity compensation and the dilemmas and challenges companies have to face. This is even more the case because of the variety in supply chains of the participating companies. When we designed BioCom, we knew that it was an innovative project and we expected to learn a lot.
Dilemmas and changes we could not anticipate in advance made the experiences even more valuable for us.

The four major conclusions that can be drawn from the lessons learned are:

1. Existing activities versus new developments was an innovative element of BioCom. The majority of biodiversity compensation examples deal with new developments; for example, a company starting economic activities in an area with significant biodiversity values. The application of a more 'restricted' definition of biodiversity compensation (that we distinguished as real compensation; see section 3.2.2) would have hardly led to any kind of biodiversity conservation within BioCom, since most of the business activities discussed concerned existing activities. BioCom experienced that important biodiversity gains can be achieved when all drivers for biodiversity loss are being analyzed and compensated for, especially when historical loss is taken into account. The assessing and compensating of biodiversity that was once there, was a whole new challenge to conquer. The issue of historical loss ('How to calculate and deal with historical loss?') was the most debated one during our project.

2. Similarities and overlaps exist between biodiversity compensation focussing on supply chain activities and biodiversity compensation for a company's own activities. The gaps ask for different tools, approaches and solutions. For example, supply chains generally generate a larger variety of impacts due to the different production and processing levels involved. We needed to accept that not all impacts could be taken into account and a focus on the larger, major impacts (risk-based approach) was necessary. Also, not all impacts could be translated (at this stage) into a biodiversity footprint. Finally, access to impact data throughout all levels of the supply chain is far from self-evident. This encourages the use of estimated guesses.

3. Supply chain compensation is a new chapter in the (short) history of biodiversity offsetting. BioCom is a good start, though far from sufficient to draw rigid conclusions or unambiguous guidance for companies. Given the current rate of biodiversity loss and the significant contribution of existing economic activities, there is a lot to win in further developing, encouraging and supporting supply chain compensation.

4. It is clear that investing more efforts into supply chain compensation will help upscaling and make it a valuable tool in motivating and/or pressing companies into responsibly conserving and sustainably using biodiversity. However, the BioCom approach, solutions and lessons learned which are shared through this publication already offer a potential for frontrunners in biodiversity compensation to build upon in the future.

Further development of supply chain compensation guidance can be supported

by taking certain steps and investments, for example, the development of tools, the undertaking of research or execution of additional pilots. Based on the lessons learned and the conclusions drawn, the following recommendations have been formulated:

Recommendations for research

Existing tools and methodologies
The scientific arena has produced a variety of biodiversity-related tools and methodologies. In our project, we have used several of these tools, such as the Mean Species Abundance (MSA) methodology to calculate the impact of land use, and water stress models to assess the impact of water use. We recommend assessing to what extent existing tools and methodologies can be aligned with the demands from (supply chain) compensation. The results should be used to (1) enhance or adjust existing tools and methodologies where possible and desirable; (2) draw up a research agenda for necessary new tools and methodologies with an assessment of input needed (time, funds, tools) to realize the same.

With respect to the use of the MSA methodology, we recommend:

1. *Improvement of the MSA methodology, such as refinement of categories, inclusion of additional pressures:* The MSA methodology needs to be upgraded or extended to a level that better suits the needs of biodiversity compensation at the company level.
2. *Combining the MSA model approach with location-specific information:* Location-specific data are still required in order to stipulate the company's footprint more explicitly (this is a combination of the MSA model and location-specific information), because the differences in ecosystems and vulnerability of these systems for pressures vary widely. In this respect, guidance needs to be drawn up as to:
   - Which local data are necessary (any site-specific biodiversity info)?
   - How should these be obtained (e.g. engaging local communities, local knowledge institutions and conservation NGOs)?
   - How can local data be combined with the use of the MSA methodology?

NB: These recommendations are not only valid for the MSA model. In general, any use of global models, literature data, etc. could best be combined with local, pressure-related data to any extent possible, in order to get the best possible quantitative picture of the pressures being researched.

New tools and methodologies
Determination of a company's bio-diversity footprint is only in its infancy. It is recommended to research new compensation tools and methodologies (based on the research agenda, see above), where needed to allow a wider use and better output of the compensation concept.

We recommend linking up with existing developments. CO_2 compensation schemes are already widely adopted and different institutions are occupied with the development of water footprint models. It is advised to ascertain where and how the different initiatives could be

brought together to develop a model for companies to compensate for the different biodiversity pressures. An example of such a combined focus is REDD+: Reduced Emissions from Deforestation in Developing Countries. This is a CO_2 compensation schedule potentially also benefiting biodiversity.

Also we recommend the development of comprehensive guidance that presents a consistent approach on biodiversity compensation issues, answering questions such as 'how can a company select a compensation area, ranging ,for example, from the preferred 'like-for-like' via 'same geographical area' to 'best conservation outcome'? Another topic that deserves attention is ecosystem services. Guidance for companies as to how to deal with ecosystem services – both in the impact as well as in the compensation area – would be very useful. It should help companies to quantify ecosystem services at least approximately and to do a first assessment to find out how relevant they are, how negative the impact is and how to compensate for that impact. Only huge relevance and/or significant impacts could be reasons to do more detailed research on the ground for a specific service. Stakeholder engagement is a key factor in this matter. The guidance for companies should therefore also advise how companies can engage stakeholders in dealing with the issues of compensation and ecosystem services.

Recommendations for companies

Dealing with biodiversity

Ten years ago, corporate social responsibility (CSR) was only on the agenda of a few multinational frontrunners. Having a CSR policy is increasingly regarded as common practice for companies these days, and it is certainly an issue taken into account by investors when assessing the company's chances on continuity. We expect that biodiversity, as one of the topics within sustainability, will follow the same development. Biodiversity is now being recognized by a handful of companies but will soon to be high on the business agenda, specifically in view of the increasing scarcity of raw materials, climate change (a significant part of the CO_2 emissions is due to deforestation) and the realization that biodiversity forms the basis of our wellbeing and economic welfare. Even today, bankers increasingly investigate the biodiversity impacts of projects when financing business activities, because they do not want to be associated with negative impacts on biodiversity.

We recommend companies to anticipate this development and already start dealing with biodiversity today in order to be prepared for legislation in this field that can be expected in the near future. Moreover, companies thus show to society their responsibility in sustainably using our scarce resources.

Some ideas:

- To map stakeholders in the area the company is active in and seek contact with NGOs and authorities to discuss biodiversity risks and opportunities in this field.
- To gather biodiversity pressure information throughout the supply chain as part of the company's ongoing environmental management system and try to minimize negative impacts (e.g. through the purchase of products/commodities with a sustainability trademark).
- To make an action plan: 'which experience, capacity, time and budget is needed for and can be given to biodiversity management (including compensation)?'
- To read the guidance for private sector companies in part VI of this document.

Joint initiatives

Starting up a biodiversity compensation project can be quite challenging for a company on its own, probably even more so for small and medium-sized companies than for multinationals. The level of ecological knowledge and expertise required, the time to be invested by dedicated employees, and the complexity of supply chain mapping could pose challenges beyond the capacity of the company. Searching for alliances within a specific sector or in a specific production area, or joining forces through trade associations could help to progress the setting up of compensation efforts.

We recommend that the larger multinationals as well as trade associations take on a leading role for initiatives within the business society, as they seem to be the most obvious players in this respect.

Stakeholder engagement
Essential in the process of stakeholder engagement is the disclosure of information by companies, not only on potential benefits but also on risks and potential adverse impacts resulting from compensation plans; self-evidently also taking social-economic aspects into account.

The general recommendation is to make the engagement as early as possible. In practice, the nature and frequency of engagement will vary, depending on the support for ideas and the feasibility of compensation plans. In practice, there may be a certain gradation in engaging stakeholders for example, discussing and developing first ideas with some key stakeholders and extending this group when more contours and data about the compensation become known.

Communication
Companies are recommended to clearly communicate on their activities and purposes in the field of biodiversity compensation. One aspect that certainly has to be taken into account in this respect is the potential suspicion of 'greenwashing'; the fact that compensation might be cheaper than mitigation measures or that the company simply considers it legitimate to destroy tropical rainforest because it is committed to biodiversity compensation. Cooperation with key stakeholders and experts, and transparency are essential in creating proper support.

The same accounts for any compensation claim a company intends to make. It is recommended trying to imagine which values and ideas are attributed to the compensation effort by the receiver of the message. The claim should be in balance with the contents of the activities, and as transparent and clear as possible. It is advisable to liaise with key stakeholders about this issue beforehand and try to agree upon the claims the company will make. This makes a company less vulnerable for negative response.

Costs
The available financial means of a company decide the delineation of the compensation effort, such as the extent of location-specific data collection and the (partial) inclusion of historical losses. Based on our project experience, we recommend that companies map all impacts in the most feasible way – including historical losses and supply chain impacts. Engaging with stakeholders helps to find out which impacts on biodiversity can be best compensated initially and how the most favourable biodiversity outcomes can be attained, given the financial means.

We also recommend weighing the efforts of data collection for certain impacts and the costs involved with the possible risks imposed by those impacts on biodiversity: most efforts and costs should be spent on getting a clear picture of the largest threats to biodiversity throughout the supply chain in question. Choices must be underpinned; a sensitivity analysis (such as in a Life Cycle Analysis) can perhaps deliver the justification desired.

Verification
Although independent verification is attractive to secure and market compensation results, it is recommended to assess other options as well. Independent verification would require the development of criteria, a certification scheme and authorized auditors. The risk is that such verification is too complicated and expensive, if it exists at all. Cooperation with recognized stakeholders or linking up with established biodiversity initiatives or programs may neutralize the lack of such a review.

Pilot projects
Time is needed to further develop compensation mechanisms as these are still in their early days. In the meantime, experience is needed to get a better grip on the challenges, dilemmas and solutions. It is therefore recommended that companies work together with governments, Non-Governmental Organizations and research institutions in pilot projects with a focus on supply chain compensation.

Recommendations for Non-Governmental Organizations

While executing this project, we learned that there is already much knowledge and expertise in the field of biodiversity compensation, but also /a vast number of issues are still to be debated, investigated, resolved and developed. We recommend for Non-Government Organizations (NGOs) to do pioneering work in this field. They are pre-eminently a party to which can play an important role in this respect because of:

- their contacts and work with the business sector (also through partnerships, joint initiatives);
- their knowledge and projects (also through own funding) in the field of biodiversity;
- their support in society;
- their ability to start (inter)national discussions and put topics on the agenda.

We also recommend NGOs to familiarize with business processes and management systems to understand where best efforts can be made to support companies in reducing their environmental/biodiversity footprint.

Recommendations for governments

Governments can be a driving force to upgrade and upscale biodiversity (supply chain) compensation. They can initiate projects, support frontrunners in different business sectors, stimulate research, develop laws and/or use contacts with other governments to join forces.

We recommend that this driving force be utilized to motivate and engage other actors to move the topic of biodiversity (supply chain) compensation forward.

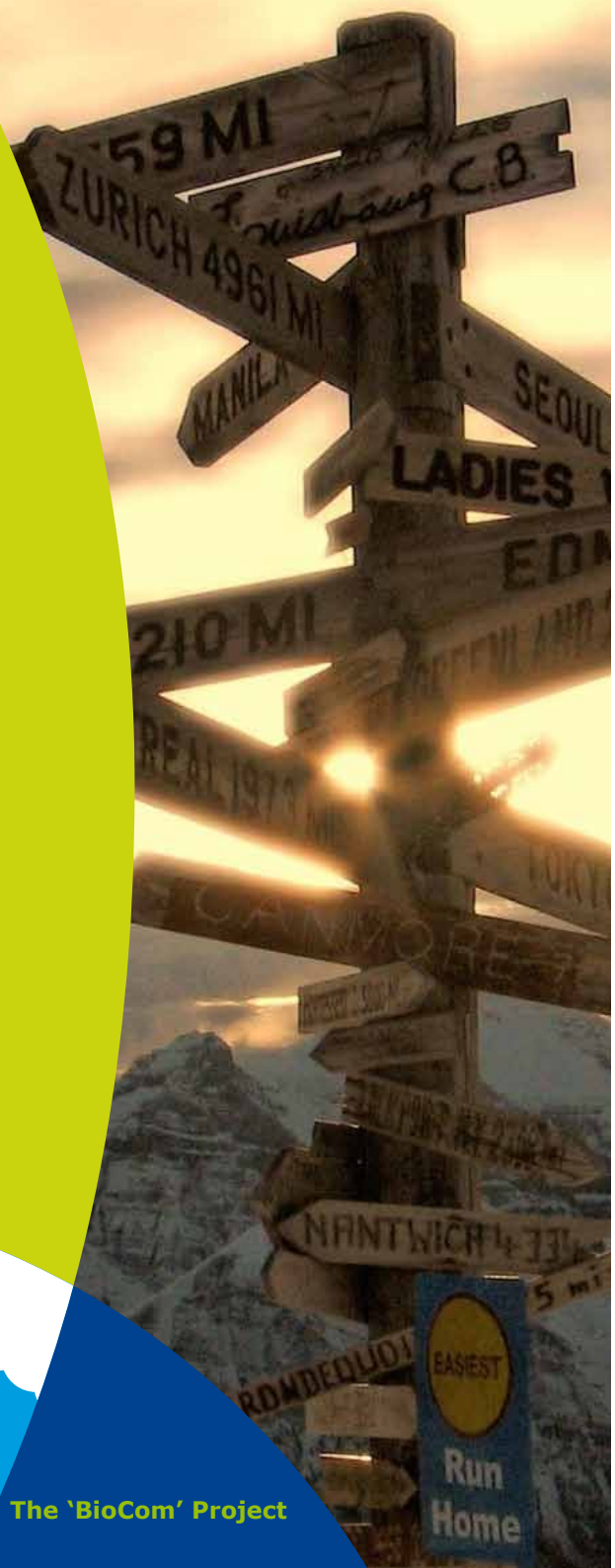
Some examples

- Most companies have a shorter lifespan than it takes for the (degraded) ecosystems to be rebuilt. It is questionable whether long-term biodiversity gains following compensation can be assured without proper frameworks being set by the government, particularly on land use planning. National/regional development plans could recognize that compensation areas are dedicated to nature conservation and sustainable resource use. Also, governments could motivate companies to link up their compensation plans with national biodiversity objectives and thus gain support on governmental level.
- Many countries are a member of the Convention on Biological Diversity. We think that the Conference of Parties of this international convention could be an excellent vehicle to start a global political discussion on the historical loss of biodiversity and how to compensate for that loss. Such a discussion is essential since companies cannot bear the responsibility (even if they want to) for major historical biodiversity losses that have occurred. Governments should provide global rules and guidance and create a level playing field.
- Society needs to be stimulated to initiate more projects and to undertake research in the field of biodiversity (supply chain) compensation. Governments are well suited to give meaning to such a stimulating role through, for example, project funding and assignments.
- Government is a party to and/or organizer of many initiatives in society, ranging from international business supporting trips to subsidizing funds and economic action plans to foreign development aid. Biodiversity compensation will move a large step forward when it receives attention, where logical, applicable and possible, in existing initiatives.

COMPENSATING BIODIVERSITY LOSS

Who will take up a leading role to move forward in the field of biodiversity supply chain compensation?

We think that BioCom has delivered valuable inputs that deserve to be taken further. We have drawn up recommendations to motivate parties to do so. The chance of this actually becoming reality is generally larger when a party adopts a leading role and motivates and agrees upon with other actors to undertake certain steps.We believe that the (No Net Loss Initiative, as part of the) Dutch Biodiversity Taskforce could take a leading role in coordination and standardization in order to get to fit-for-purpose guidance and the conservation outcome aimed for. One of the first activities could be the organization of an (inter)national stakeholder meeting to discuss the BioCom conclusions and recommendations and make concrete steps and agreements with businesses to encourage the further development and implementation of voluntary (supply chain) compensation.



Part 6

Guidance for biodiversity compensation by private sector companies

PART VI - GUIDANCE FOR BIODIVERSITY COMPENSATION BY PRIVATE SECTOR COMPANIES

Habitat loss and damage to biodiversity endanger the future wellbeing and welfare of mankind. One of the main causes for the loss of biodiversity is rooted in human activities: the way we produce, the resources we consume, etc. Some countries in the world have already implemented the compensation for biodiversity loss in their policy and legislation, although it is almost exclusively concentrated on the loss of protected areas, and on endangered species or habitats. Given the current rate of biodiversity loss, it can be expected that more and more countries will follow. This makes it even more important for private sector companies to take make their initial steps towards voluntary biodiversity compensation.

In anticipation of relevant laws and regulation, practical experience would be beneficial and would provide valuable knowledge in policy negotiations. An increasing number of private sector companies feel a responsibility to minimize or even compensate for the loss of biodiversity they create. They simply do not know how to do this. This part of our report offers guidance for private sector companies to take on the challenge of putting voluntary biodiversity compensation[26] into practice.

However, we want to share an important message first. Our case studies demonstrate that the 'rules' of compensation cannot be fully designed nor can the structure be clearly defined in advance. There is no 'one size fits all' approach as far as biodiversity compensation is concerned, since no two hectares are ecologically similar and the biodiversity footprint is hard to express by a single, generally accepted indicator.

Our experiences in BioCom made it possible to draw up a guidance that meets the increasing interest in the topic and helps companies move forward towards the implementation of supply chain biodiversity compensation (see outline on the next page). It consists of a number of steps to be taken, a blueprint for developing and implementing biodiversity compensation plans.

26 A definition of biodiversity compensation is given in section 3.2.2.

COMPENSATING BIODIVERSITY LOSS

COMMUNICATION & STAKEHOLDER ENGAGEMENT

The eleven steps, and the stakeholder engagement & communication are elaborated below.

Step 1 Ensuring in-company commitment

It is essential to ensure in-company commitment and support for the development of the biodiversity compensation plan and, once developed, for its implementation. Moreover, it asks for leadership to communicate and demonstrate this commitment internally. For the purpose of internal support, coherency and efficiency, the process of biodiversity compensation and following actions should be integrated into existing environmental management operational systems and action plans.

Step 2 Describing company activities

Step 2 comprises the description of the company's core business and an outline of the basic parts of the different supply chains that it belongs to. Often companies are part of one or more supply chains and perform different roles, for example, being a primary producer in one supply chain, a processing unit in another one and a buyer of (semi-) manufactured goods in a third, etc.

Step 3 Selecting relevant company activities for compensation

Activities can be harmful for biodiversity in terms of their type, scale, location, duration, timing, and level of reversibility. This step serves to screen company activities to determine whether and how they pose a threat to biodiversity, with the aim to select relevant activities for compensation. Screening can take place based on the following criteria:

Severity of impact on biodiversity

At a first glance a company's activities can be categorized as having either a small, medium or a large impact on biodiversity. It makes sense to focus biodiversity compensation on activities/products with a medium or large impact on biodiversity. Literature and expert advice can be sought to find a decision in this respect.

Impact on biodiversity-rich areas

The location of activities throughout the supply chain can determine the focus of the compensation efforts. Generally speaking, impacts on pristine natural areas demand more attention than impacts resulting from a production site in an industrial zone. Criteria to consider are (1) the vicinity of the production site to protected areas or to areas supporting protected species; (2) the vicinity of areas that do not have a protected status but are important for biodiversity, such as ecological corridors; and (3) areas providing imported ecosystem services, such as fish breeding grounds, cultural sites, flood storage areas, etc. A company may use national/regional

overviews of High Conservation Value Areas to assess the biodiversity value of a specific location[27]. The concept of High Conservation Value Areas is adopted in various certification processes.

Risks and opportunities

What risks and opportunities are linked to the company's (potential) impacts on biodiversity? These will differ according to country, location, sector and company and should be made transparent in each specific case, as they may determine where to concentrate the compensation.

The screening results indicate which company / supply chain activities might have a potentially significant effect on important biodiversity values and ecosystem services, and where these activities take place. They provide the basis for the decision as to which activities should be selected for compensation.

NB: In view of the topic of this paper – supply chain compensation – it is important to take the entire supply chain into account when screening a company's activities. Purchasing soy, for example, may in itself be an activity that has little negative impact on biodiversity. The soy supply chain as a whole, however, can cause serious negative impacts, primarily due to deforestation.

Step 4 Assessing the pressures on biodiversity

This step comprises the identification of the pressures on biodiversity that result from the selected company activities (step 3). The pressures can be identified in conformity with the diagram shown in figure 6.1 which illustrates a structured process. Examples of inputs are land, raw materials, water and energy, while discharges could be emissions, waste and/or noise. The process is similar to

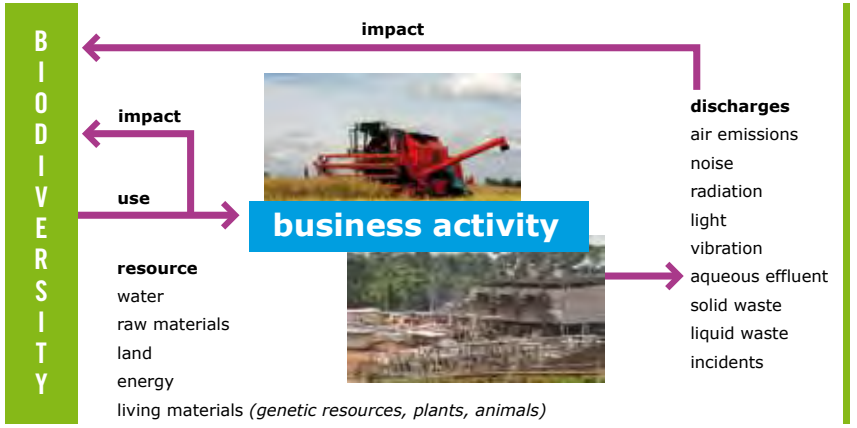


Figure 6.1 Resource use-discharge model for a structured way of scoping biodiversity pressures'

27 See, for example, HCV Resource Network, http://www.hcvnetwork.org/

the well-known Impact Assessment process and therefore familiar to many companies. Many of the pressures that impact biodiversity will, for a certain part, be covered by regulation, legislation and company policy. However, this often will not come under the name of 'biodiversity' and therefore will not mitigate the impacts on biodiversity to the full extent. In the case of water use, for example, attention is generally given to the volume of water used, but hardly ever to the origin of that water and the potential negative impacts that cause changes in the ground water level or the water catchment area.

Step 5 Undertaking a biodiversity baseline assessment

The baseline assessment delivers (if possible, quantitative) information on (1) the pressures identified, and (2) the potential consequences for biodiversity by way of a description and analysis of the existing biodiversity.

It is important to be aware of those negative influences on biodiversity that exceed the immediate area where the activities are carried out:

- *Location:* the actual area that will be impacted may be larger due to indirect effects (see the water example in step 4).
- *Time:* some impacts may occur only after a certain period of time.
- *Cumulative:* a single pressure may not be an issue, while the combination of several insignificant pressures – by the company and perhaps also by other parties active in the same region – may cause substantial impacts.

Information can be found in company databases, obtained from expert NGOs, scientists or other stakeholders, procured through field work, etc. The following is to be taken into account when collecting information:

- If specific information cannot be found or could only be derived from extensiveand expensive research, companies could make an estimated guess based on existing research material or expert advice. It may be particularly difficult to obtain quantitative information regarding the biodiversity pressures created by other parties in the supply chain,
- Similarly to the case of life cycle analyses it is advised to disregard information referring to sub-supply chains, such as the production of capital goods.

Step 6 Stipulating the biodiversity footprint

It would have been helpful to have a universally accepted method to calculate the biodiversity footprint and stipulate the appropriate counter value of the compensation, like the CO_2 equivalent in global warming, but such a single, generally accepted 'currency' is not available. This means that several policies and initiatives have each developed their own, respective way to stipulate a biodiversity footprint.

A biodiversity footprint can be defined as the summation of all pressures that

have potential effects on biodiversity. A practical approach to express the biodiversity footprint is given in table 6.1[28]. This approach describes the (quantified) impacts on biodiversity that can be categorized into one of the four pressure groups: land use change, CO_2 (equivalent) emissions , water use and miscellaneous (the latter group serves to cover all pressures that fall outside the scope of the three other categories). A biodiversity footprint is then calculated for each pressure group in the currency listed in table 6.1. Miscellaneous pressures will have their own specific footprint or there is no method available at present to convert the pressure caused into a footprint measure. A correction factor may be used to match up with uncertainties, lack of methodologies and/or missing quantitative data in the biodiversity footprint calculations.

Table 6.1 From pressure to biodiversity footprint

Pressure:	**Biodiversity footprint expressed in:**
Land use change	Hectare
CO_2 (equivalent) emissions	CO_2 equivalent
Water use	Water stress (country level)
Miscellaneous	Variable

Step 7 Taking prevention and/or mitigation measures

The general approach for mandatory and voluntary compensation is that prevention and/or mitigation measures that avoid or reduce negative impacts on biodiversity have priority over biodiversity compensation. The 'rule' is to apply the mitigation hierarchy[29]. Compensation applies only to the unavoidable residual impact on biodiversity.

This step enforces the rule that companies should first look for ways of preventing or mitigating the negative biodiversity that their activities are creating. Examples in this respect are:

- re-location of activities from a location where activities impact on High Conservation Value Areas;
- re-designing the production process to reduce water use, to recycle water or avoid the emission of heavy chemicals;
- sourcing certified 'input' for the production process, e.g. raw materials that are produced under a certification scheme which includes biodiversity-related criteria.

28 This methodology is elaborated in section 3.3.4. The summaries in chapter 4 of this publication can serve as examples to calculate the footprint.

29 The mitigation hierarchy is explained in section 3.4.1.

This step often necessitates some applied research before a decision can be made about the feasibility of certain measures and their consequence on biodiversity. There are various factors which determine whether a company can pursue prevention and mitigation measures successfully. Important factors include: the availability of research for potential technical innovations, costs, the position of a company in the supply chain (the impetus to address the biodiversity impact will probably be stronger in the case of a direct impact and so will be the possibilities to address the impact on biodiversity); the power of a company (the relative power a company has in comparison with other companies in the production chain) and the level of willingness to cooperate in the supply chain.

It is important to consider the entire range of potential measures in this step, including alternatives that lead to set up an entirely new supply chain (for example, as a result of a change in the use of raw materials).

Step 8 Establishing the residual impact on biodiversity

Upon the implementation of preventive and/or mitigation measures it is necessary to recalculate the company's residual biodiversity footprint. The methodology given in step 6 can be used.

Step 9 Selecting a biodiversity compensation option

Different biodiversity compensation options can be selected ranging from designing a compensation format that specifically targets the company's residual impact to joining up with existing biodiversity-related initiatives. Each company needs to make its own comparative assessment as to which option suits the company best. This assessment includes a decision concerning the extent to which all supply chain impacts – direct, indirect, historical or ongoing – the company can and will take into account. Up to step 9, every impact on biodiversity and the occurring biodiversity loss throughout the full supply chain will have been considered, and measured. Step 9, however, serves to decide the actual loss for which the company will assume responsibility. The decision will depend on the financial means available for compensation and many other factors. The extent to which a company feels morally responsible for activities further along the supply chain is important.

It should be analyzed how effective the various options may be. Table 6.2 can assist that process; it provides a non-exhaustive overview of qualifying aspects to select a compensation option. The company could incorporate such qualifying aspects into a scorecard and allocate a score per aspect per biodiversity compensation option. The better a compensation option matches the requirements, the higher the chance that it will result in effective biodiversity compensation.

Table 6.2 Overview of qualifying aspects to select a compensation option

Aspect:	Explanation:
Quantity	The quantitative relationship between the biodiversity footprint and the extent of the compensation (e.g. the number of hectares of the impact area compared to the number of hectares in the compensation area).
Quality	The quality of the compensation area in relation to the impact area (prior to intervention). Aspects like 'like-for-like', 'no net loss' and 'best conservation value' are relevant in this respect.
Location	The distance between the compensation area and the impact area is important. A minimum geographical distance is generally preferred because both areas will then be more likely to have similar soil types and vegetation ('like-for-like'), and regional ecosystem services may be maintained.
Development time	Time required for a certain type of compensation to fully develop. For example, the time needed to develop a degraded area into an area with biodiversity value.
Additionality	The extent to which the compensation measures meet the additionality requirement.
Land and user rights	No involuntary transfer or shift of rights should occur as a result of the purchase, design and management of the compensation area.
Impacts on biodiversity	Taking into account cumulative effects, historical losses, supply chain impacts and other indirect impacts.
Biodiversity gains	Benefits that result from the implementation of compensation.
Synergy	Benefits gained in other areas as a result of the implementation of compensation.
Costs	Compensation costs in relation to biodiversity gains and benefits in other areas (effectiveness).

Step 10 Preparing the biodiversity compensation plan

The contents of the compensation plan will be case-specific. Already table 6.2 gives a non-exhaustive overview of the type of topics to be addressed in the biodiversity plan with respect to the compensation option chosen. Table 6.3 provides an overview of additional aspects to be discussed as they delineate the framework within which the compensation activities will be carried out.

Table 6.3 Overview of additional aspects for inclusion in a biodiversity compensation plan

Aspect:	How has the company covered this aspect?
Permanence of compensation	Assurance that the compensation area is free from negative impacts for a defined or undefined period of time.
Stakeholder engagement	Engagement of the relevant stakeholders with respect to the design, development, and execution of the compensation plan.
Responsibility	Description of compensation activities, deliverables and responsibilities.
Compliance	Settling of verifiable compensation achievements that need to be monitored for compliance.
Monitoring	Independent measuring of and reporting on Key Performance Indicators.

Step 11 Implementation requirements

Part of the compensation plan involves the identification of necessary activities, deliverables and timeline regarding the implementation of the biodiversity compensation plan. It should list, for example:

- What should be done and by whom?
- Which stakeholders will be engaged and how/when?
- Who is responsible for what - roles and responsibilities allocated to the company, supply chain partners, hired expertise and stakeholders)
- What budget is allocated to which activities?
- When will activities be carried out (planning)?

Also, companies may wish to draw up a communication plan for the intended communication with stakeholders (written, spoken, electronic interaction). An engagement and communication plan could include:

- The objectives of the communication and engagement: what does the company wish to accomplish?
- Ways in which the objectives can be accomplished (goals);
- The target group: who will be addressed by the communication, who will be engaged?
- A list of activities, including dedicated capacity, to achieve the objectives (timetable, tools such as website, brochure, meeting);
- An evaluation plan to measure the results of the communication and engagement.

Stakeholder engagement & communication

The dialogue with the stakeholders is not presented as a separate step; it is an activity that is an ongoing process, from the start until the end of the preparation and implementation process albeit at different levels of intensity depending on the process phase. A stakeholder can be defined as a person, group, organization, or system that affects or can be affected by the company's actions: representatives in the areas of science, policy and interest groups but also parties whose value allocated to biodiversity is significant for the acceptance of the compensation chosen and the promotional value of the plan, such as local communities. It can generally be stated that a proper stakeholder engagement process is a key factor for successful biodiversity compensation.

The objective of the dialogue with the stakeholders is to share information, to learn their concerns, to obtain data and comments from them and to share ownership in respect of measures to reduce impacts and to provide opportunities that are beneficial at the appropriate level. Stakeholders can be engaged in the scoping, designing, developing phases and/or the implementation phase of the biodiversity compensation. The process of stakeholder engagement (who? when?) is to be decided upon by the company, preferably in an interactive way with the key stakeholders. Views on the timing of their engagement might be different. One company might prefer taking the first steps together with a research institute or expert NGO, while another company may decide to engage the local communities right from the beginning. It is important for the companies, though, to consider and plan this engagement carefully in order to obtain the necessary (local) support. A stakeholder analysis prior to the development of a compensation plan can provide a clear picture of the stakeholders to be involved.

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pelican communication