No Net Loss and *Net Positive Impact* Approaches for Biodiversity

Exploring the potential application of these approaches in the commercial agriculture and forestry sectors

GLOBAL BUSINESS AND BIODIVERSITY PROGRAMME

Published by: IUCN, Gland, Switzerland

Citation: Aiama D., Edwards S., Bos G., Ekstrom J., Krueger L., Quétier F., Savy C., Semroc B., Sneary M. and Bennun L. 2015. No Net Loss *and* Net Positive Impact Approaches *for Biodiversity: exploring the potential application of these approaches in the commercial agriculture and forestry sectors.* Gland, Switzerland: IUCN. XX pp.

ISBN: 978-2-8317-1718-0

Design/Layout: Thad Mermer

Produced by: Global Business and Biodiversity Programme

Available from: IUCN (International Union for Conservation of Nature)
Global Business and Biodiversity Programme
Rue Mauverney 28
1196 Gland
Switzerland
Tel +41 22 999 0000
Fax +41 22 999 0002
biobiz@iucn.org
www.iucn.org/publications

This guide is published online only.

Cover photo: © IUCN/Deviah Aiama, Agriculture and forestry land use in a landscape in Nicaragua

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Authorship

This report incorporates the views of a working group of conservation and business experts who first convened in a workshop at IUCN Headquarters at the end of 2013, and via subsequent discussions during 2014.

The report is prepared and co–authored by Deviah Aiama, Programme Officer in IUCN's Global Business & Biodiversity Programme at IUCN Headquarters (HQ). These members of the working group are also co–authors of this report (in alphabetical order by surname):

- Leon Bennun, The Biodiversity Consultancy, Technical Director
- Gerard Bos, IUCN HQ, Director, Global Business & Biodiversity Programme (BBP)
- Steve Edwards, IUCN HQ, Programme Manager, BBP
- Jonathan Ekstrom, The Biodiversity Consultancy, Director
- Linda Krueger, The Nature Conservancy, Senior Policy Advisor, Sustainable Infrastructure
- Fabien Quetier, Biotope, Lead consultant on biodiversity offsets & ecosystem services
- Conrad Savy, Biodiversity Specialist, Independent Consultant
- Bambi Semroc, Conservation International, Senior Strategic Advisor, Centre for Environmental Leadership in Business
- Martin Sneary, IUCN DC Office, Manager – Biodiversity Risk Assessment, Corporate Decision Support

Acknowledgements

We are grateful for working group participation and input received from the following:

- Richard Aishton, IUCN HQ, ENPI FLEG Programme Coordinator, Global Forest and Climate Change Programme (GFCCP)
- Amanda Bradley, Shell International, Downstream SD/SP adviser (working group member)
- Chris Buss, IUCN HQ, Deputy Director, Global Forest and Climate Change Programme (GFCCP)
- Giulia Carbone, IUCN HQ, Deputy Director, BBP
- James Dalton, IUCN HQ, Water Programme
- Veronika Dornburg, Shell International, Biofuels Feedstock Adviser (working group member)
- Andrew Heald*, UPM–Kymmenne, Manager – International Stakeholders, Sustainable Plantations (working group member)
- Timo Lehesvirta, UPM–Kymmenne
- Anne Merete Nielsen*, Novozymes, LCA Specialist (working group member)
- Stewart Maginnis, IUCN HQ, Nature–based Solutions Group, Global Director
- Julie Reneau, Nestle–Nespresso, Sustainability Programme Manager (working group member)
- Luís Neves Silva, WWF International, Manager, New Generation Plantations (working group member)
- Elina Virtanen*, UPM–Kymmenne, Senior Specialist, Sustainable Energy and Biofuels (working group member)

*No longer with the company listed

And we are grateful for the input from two Independent Reviewers:

- Nathaniel Carroll, Forest Trends, Ecosystem Marketplace – Associate Director
- Toby Gardner, Stockholm Environment Institute, Research Fellow

The working group is grateful to Shell International and UPM–Kymenne for co–financing provided to this project.

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Summary

What are *No Net Loss* and *Net Positive Impact* approaches for biodiversity in a business context?

Leading companies in the primary natural resource sectors are setting more targeted and measureable environmental goals. This is based on an increasing recognition by business that they need to manage their operational and reputational risks due to major drivers of environmental change such as water scarcity, pollution, climate change, and biodiversity loss.

In regards to biodiversity related risks, such goals are increasingly being framed as 'No Net Loss' (NNL) or 'Net Positive Impact' (NPI) goals[s1]. While there are no universal definitions as yet, conceptually NNL and NPI goals are biodiversity goals for development projects. These goals call for negative biodiversity impacts caused by the project to be either balanced (for NNL) or outweighed (for NPI, also referred to as net gain) by biodiversity gains through compensation measures implemented in the project region. The biodiversity gains are evaluated against a baseline (e.g. a reference point or trajectory without the project occurring, or prior to the project occurring) of the relevant biodiversity values being impacted by the project. From a conservation perspective, achieving an NNL or NPI goal for a given project ultimately means no net reduction in the:

- diversity within and among species and vegetation types;
- long–term viability of species and vegetation types; and,
- functioning of species assemblages and ecosystems, including ecological and evolutionary processes.[s2]

The 'net' in NNL and NPI acknowledges that some biodiversity losses at the development site are inevitable, and that biodiversity gains may not be perfectly balanced in regards to the time, space, or type of biodiversity impacted. This is due to the inherent limitations of information available on the species and ecosystems involved.[s2] It is therefore always recommended to overcompensate for residual impacts – meaning that defining and achieving an NPI goal is a precautionary way of ensuring an NNL outcome for biodiversity. For NPI goals to be achieved credibly, they typically must follow a systematic biodiversity management approach commonly known as the 'mitigation hierarchy' – widely regarded as the best practice approach for managing biodiversity risk and realizing conservation opportunities in development projects (see Figure 1, page 12).

Why focus on commercial agriculture and forestry sectors?

Developments in primary natural resource sectors such as agriculture, extractives, wood production, water management, wildlife trade and fisheries largely shape the state of global biodiversity as they exert direct pressures on biodiversity (namely: habitat loss and degradation, overexploitation, invasive species, pollution and climate change).[s3] These sectors also depend on biodiversity and ecosystems in various ways to provide food, fibre, wood, bioenergy and clean water for the world's growing human population.[s3] Understanding the feasibility of NPI approaches in all of these sectors is therefore critical for the world to meet the UN Convention on Biological Diversity's mission of halting biodiversity loss by 2020, and its longer term vision of 'Living in Harmony with Nature' by 2050.[s4]

To date however, much of the experience in implementing approaches with explicit NPI goals for biodiversity has been in the extractives and infrastructure (E&I) sectors. In part, this is because these sectors typically have more spatially and temporally defined impacts managed by fewer stakeholders over a specific timeline, compared to the commercial agriculture and forestry (A&F) sectors. Also, E&I sectors generally have more financial capital available, as well as exposure to financial sector standards with NNL and NPI requirements (for certain habitat categories) such as IFC's Performance Standard 6 and the Equator Principles.[s5, s6]

What is the aim and approach of this report?

This report is an outcome of an exploratory workshop held by IUCN in October 2013, and subsequent discussions in 2014, of a working group of relevant business and conservation experts (see authorship and participation on page 3). The working group was convened by IUCN's Global Business and Biodiversity Programme. It is the beginning of a sector–specific discussion on the application and challenges of NPI approaches in business sectors with significant biodiversity impacts.

The objectives of this report are:

1) To learn from the NNL/NPI experience of the E&I sectors, and propose an organizing framework for applying NNL/NPI approaches in other business sectors; and, 2) To explore the potential for applying NPI approaches in A&F sectors. It outlines a five stage process to implement a generic NPI approach (see Figure 2 page 17), and describes what this process could look like when implemented in three hypothetical A&F landscape scenarios: 1) existing managed land, 2) using ecologically degraded land, and 3) expanding into new legally authorised concessions.

This report builds on existing sustainability efforts of the A&F sectors (e.g. sustainability standards) and outlines the potential benefits an NPI approach could add in relevant situations (see Figure 5 page 32). It focuses mainly on voluntary efforts companies can take for NPI for biodiversity, and does not include issues related to public policy, ecosystem services, or socio–economic conditions. While these are important issues to consider, the working group decided to limit the scope of an already broad topic.

Is an NPI approach potentially applicable to the commercial agriculture and forestry sectors?

Yes – based on the application of the five stage process, which includes the full implementation of the mitigation hierarchy – an NPI approach could potentially be applied in A&F development projects under two main conditions (not mutually exclusive):

1. Enhancing native biodiversity, and/or protecting species or areas of conservation concern:
    - » Where A&F production systems are designed to host more native wildlife, and to reduce impacts on native wildlife.
    - » Where species or areas of conservation concern are identified within the project site and are protected against negative impacts from productive activities.
2. Diversifying A&F production species on–site, and/or, improving productivity and natural resource use efficiency on–site along with promotion of safeguards to protect natural habitats off–site against conversion:
    - » Where crop and timber species are diversified through the introduction of new crops, agroforestry, or timber species on site.
    - » Where the productivity of A&F production systems are increased through yield gains and improved use of natural resources (e.g. water, soil, energy) and accompanied with safeguards to protect against conversion of existing natural areas including beyond project boundaries.

By highlighting favourable conditions for NPI approaches in A&F sectors, the report also indicates three main conditions that would not be favourable, on the basis that the risk of biodiversity losses would outweigh any opportunity for additional conservation gains:

1. Where the development project will cause large–scale impacts on ecosystems and/or species in natural areas where regional biodiversity loss is not occurring.
2. Where there is a risk that the protection measures and safeguards for natural habitat areas and/or species and areas of conservation concern in and around the production site will be poorly designed or will not be enforced effectively.
3. Where the identification of relevant biodiversity values to establish NPI goals has not been derived from existing societal biodiversity conservation goals in policies or plans (e.g. national biodiversity policies, strategies, action plans, international policy), and not taken account of local and other relevant stakeholder input (including farmers, foresters, and resident communities as applicable).

Next Steps

This report intends to stimulate new ways of thinking and should not be considered comprehensive, focussing instead on raising relevant issues that will require further investigation. Going forward, there is still much to do with exploring the application of an NPI approach in A&F sectors. The main recommendation of the working group for an important next step is:

- Pilot this NPI approach in suitable A&F situations. To date, the working group is not aware of projects that have piloted NPI approaches in A&F landscapes. By piloting the NPI approach proposed here, its feasibility can be assessed in more detail, and practical information regarding some critical aspects in the A&F context can be gained, including:
  - » Establishing appropriate reference frames for evaluation of progress towards NPI goals.
  - » A better understanding of the boundaries between the steps of the mitigation hierarchy, including what A&F measures will count as meeting the objectives of the avoidance, minimise, restoration and compensation steps.
  - » A broader consideration of appropriate compensation options including area–based offsets, resources allocated to addressing drivers of biodiversity loss, and strengthening of protected area management in the landscape or region.
  - » A better understanding of the types of NPI claims that can be made once NPI goals are achieved.

IUCN's Global Business and Biodiversity Programme welcomes future collaborations with organisations interested in working on these suggested topics, to advance how A&F sectors can have more defined conservation impact.

References (for Summary section only)

s1. Rainey et al. (2014): A Review of Corporate Goals of No Net Loss and Net Positive Impact on Biodiversity. Oryx, DOI: http://dx.doi.org/10.1017/S0030605313001476

s2. Gardner et al. (2013): Biodiversity Offsets and the Challenge of Achieving No Net Loss. Conservation Biology, DOI: http://dx.doi.org/10.1111/cobi.12118

s3. CBD Secretariat Technical Series No. 79 (2014): How Sectors Can Contribute to Sustainable Use and Conservation of Biodiversity

s4. UN Convention on Biological Diversity, Strategic Plan for Biodiversity: http://www.cbd.int/sp/

s5. International Finance Corporation Performance Standards: www.ifc.org/sustainabilityframework

s6. Equator Principles: http://www.equator–principles.com/

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Section 1: Context

In this section

- Report aim
- Defining No Net Loss (NNL) and Net Positive Impact (NPI) goals
- Mitigation hierarchy for managing biodiversity risk
- Main NNL and NPI trends and drivers in business sectors
- Report approach

1.1 Report aim

The objectives of this report are:

- To learn from the NNL/NPI experience of the extractives and infrastructure sectors, and propose an organizing framework for applying NNL/NPI approaches in other business sectors.
- To explore the potential for applying NPI approaches in commercial agriculture and forestry sectors.

1.2 There are no universal definitions for NNL and NPI impact goals

While there are no universal definitions as yet, conceptually NNL and NPI goals are biodiversity goals for development projects. These goals call for negative biodiversity impacts caused by the project to be either balanced (for NNL) or outweighed (for NPI, also referred to as net gain) by biodiversity gains through compensation measures implemented in the project region. The biodiversity gains are evaluated against a baseline (e.g. a reference point or trajectory without the project occurring, or prior to the project occurring) of the relevant biodiversity values being impacted by the project. From a conservation perspective, achieving an NNL or NPI goal for a given project ultimately means no net reduction in the:

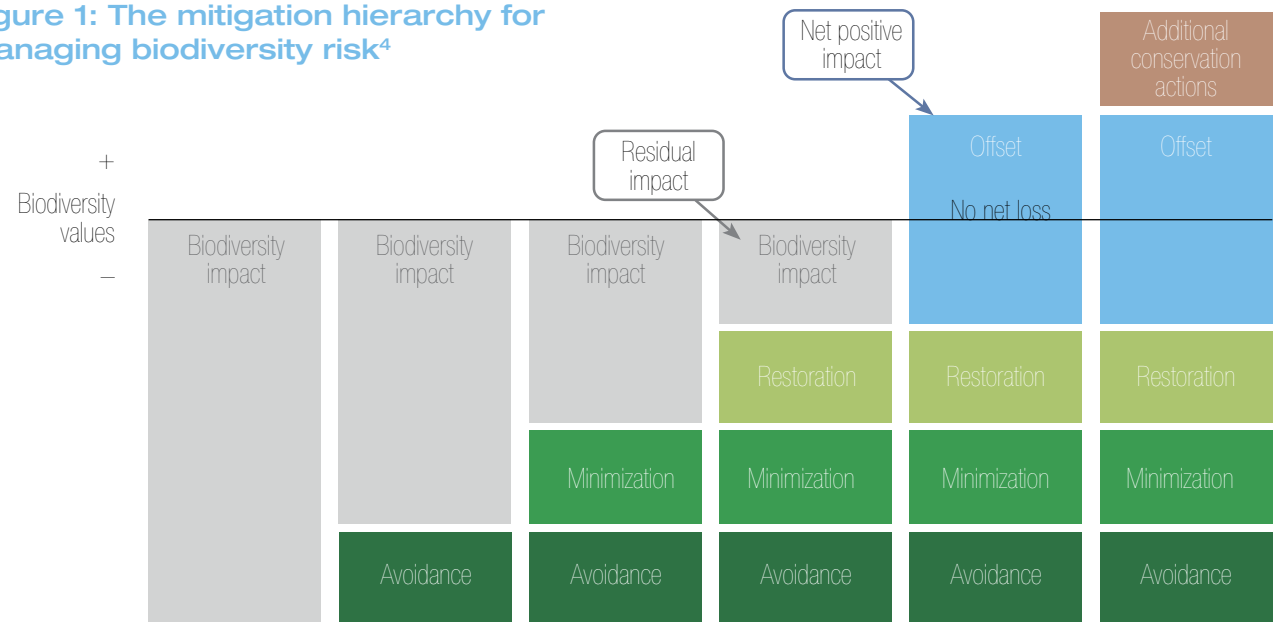
- diversity within and among species and vegetation types;
- long–term viability of species and vegetation types; and,
- functioning of species assemblages and ecosystems, including ecological and evolutionary processes[1].

The 'net' in NNL and NPI acknowledges that some biodiversity losses at the development site are inevitable, and that biodiversity gains may not be perfectly balanced in regards to the time, space, or type of biodiversity impacted. This is due to the inherent limitations of information available on the species and ecosystems involved[2]. It is therefore always recommended to overcompensate for residual impacts – meaning that defining and achieving an NPI goal is a precautionary way of ensuring an NNL outcome for biodiversity. For simplicity, this report only uses the NPI term from here on. This report refers to both NPI 'goals' – the explicit biodiversity conservation outcomes established for a given development project, and NPI 'approaches' – the implementation processes for achieving these established goals.

Identifying the relevant biodiversity values (e.g. threatened species and/or ecosystems) that the NPI goal will target is critical. These values are best derived from existing societal biodiversity conservation goals in policies and plans (e.g. national biodiversity policies, strategies, action plans, international policies, development bank safeguards). If these are absent or limited, then the biodiversity values should be determined in consultation and agreement with local and other relevant stakeholders, and biodiversity experts. NPI goals must be clearly defined, time–bound, quantifiable biodiversity targets that are related to the project's impacts. They must also consider conservation and development needs in the broader landscape (i.e. beyond project site boundaries) within which the project exists or is planned.

It is important to reiterate that NPI currently has no universal definition, as it depends on what biodiversity and human preferences are accounted for and how they are accounted for. For example, NPI goals can vary in terms of spatial scales, what biodiversity is included, what constitutes appropriate compensation efforts such as biodiversity offsets in the project region, and over what timeline the goal is achieved. NPI goals must reflect the specific biodiversity context and the types of activities that will be undertaken as part of the development project and

Figure 1: The mitigation hierarchy for managing biodiversity risk[4]



their potential to cause negative impacts. NPI goals can be defined in varying ways. This makes the concept adaptable to specific situations, but can also create uncertainties about how to achieve such goals operationally and credibly. This report aims to start addressing such uncertainties.

1.3 The mitigation hierarchy for managing biodiversity risk

For NPI goals to be achieved credibly, they typically must follow a systematic biodiversity management approach commonly known as the 'mitigation hierarchy for managing biodiversity risk'. The mitigation hierarchy (MH) is widely regarded as the best practice approach for managing biodiversity risk and realizing conservation opportunities in development projects. It was formalized within the UN Convention on Biological Diversity (CBD) in 1992 but has been active policy in several European countries and the USA since the 1970s[3].

The MH is a logical and sequential framework that enables project investors and developers to think through strategies for achieving NPI goals. Within this framework, project developers are able to identify, first and foremost, those impacts that should be avoided (e.g. because there is no ability or capacity to compensate for them), then those that can be minimized, and those that will require restoration. Finally, developers must consider those impacts where additional actions may be required (i.e. to compensate for residual negative impacts). The MH often needs to be applied iteratively to reduce as far as possible the residual negative impacts remaining after avoidance, minimization and restoration measures. Compensation measures are typically referred to as offsets[i] (see Figure 1). Applied properly in a sequential and iterative manner, application of the MH will only permit the use of offsets to compensate for residual negative impacts. To help achieve NPI goals through offsets, there are four recognized core principles[ii] that must apply:

- Limitations: there are limits to offsets – not all impacts can be offset;
- Additionality: biodiversity gains from offsets should be demonstrated to be additional to business–as–usual scenarios;
- Equivalency: biodiversity gains achieved must be comparable in type to the biodiversity losses incurred by the project; and,
- Permanence: the biodiversity gains achieved are lasting and protected from risk of failure.

i Biodiversity offsets are defined as: "Measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people's use and cultural values associated with biodiversity". (Business and Biodiversity Offsets Programme (BBOP) 2015)

ii These four core principles are adapted from Gardner et al. (2013) who propose a generalized conceptual framework of the offset–related conditions and design activities necessary to evaluate efforts to achieve a NNL outcome. There is an increasing body of scientific literature and knowledge on establishing conceptual frameworks, principles, and conditions for positive conservation outcomes from biodiversity offsets in development projects – these are all synthesised in a recent IUCN report (Pilgrim and Ekstrom 2014) and will therefore not be dealt with in detail here.

1.4 Commitments to NPI goals are increasing in business due to several drivers

An increasing number of companies are referring to NPI goals to guide their environmental commitments. Since 2001, thirty-two companies have made public commitments or aspirations towards NPI (or similar wording) for the environment – of which eighteen specifically include biodiversity. Mining companies (including minerals, metals, aggregates and coal mining) have set the most publicly stated NNL/NPI goals (41%) to date and are the majority of those that include biodiversity specifically. Energy and manufacturing are the next largest contributors (16% and 13% respectively), with the remaining companies from sectors as diverse as entertainment and retail – but no agriculture or forestry companies have as yet made NNL/NPI commitments[5]. The main drivers of this trend are public policy, financial sector standards, and company operational and reputational risks, all of which are creating a strong business case for more targeted biodiversity management by business.

At a global policy level, the CBD's Aichi Target 5 states that "By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero" – aspiring towards a NNL goal for all natural habitats, to be achieved through biodiversity policy in over 190 countries that have ratified the CBD[6]. At a regional policy level, the European Union's Biodiversity Strategy is aligned with this target and seeks to "ensure no net loss of biodiversity and ecosystem services" by 2020[7]. At a national policy level, some countries are requiring NNL/NPI goals in certain biodiversity related regulations (more so in OECD countries).[8,9]

In the financial sector, the International Finance Corporation's (IFC) Performance Standard 6 (PS6) on 'biodiversity conservation and sustainable management of living natural resources' requires business projects it invests in to achieve NNL of biodiversity in areas of natural habitat (where feasible) and net gains of critical habitat values[10]. IFC's environmental and social performance standards are influential sustainability safeguards in major business development projects, and have been integrated into the Equator Principles – a risk management framework adopted by 79 financial institutions in 34 countries for determining, assessing and managing environmental and social risks in projects in all industry sectors[11]. Many other multi–lateral finance institutions (e.g. Inter–American Development Bank, European Bank for Reconstruction and Development) also have closely aligned policies and practices.

Leading companies dependent on natural resources are recognising the operational risks posed to their business from major drivers of environmental change (such as water scarcity, pollution, climate change, and biodiversity loss), as well as reputational risks from increasing stakeholder expectations to contribute to meaningful action to address these drivers. For example, the World Business Council for Sustainable Development's (WBCSD) Action 2020 platform supports its member companies to contribute to reducing the loss of ecosystems: "By 2020, reduce the loss of natural ecosystems and restore degraded ones so that biodiversity and ecosystem services are maintained"[iii]. And, the Consumer Goods Forum (CGF) has committed to mobilise resources within their member companies "to help achieve zero net deforestation by 2020"[iv].

However, despite these drivers, at present most corporate NPI goals have progressed little beyond aspiration and definition[12], apart from a few cases in some sectors. From a conservation perspective, such goals are much needed, but achieving them has proven difficult and experience in business sectors is limited. Currently only the extractives (mining in particular) and infrastructure sectors have some experience with setting explicit NPI goals for biodiversity in priority sites and implementing actions to achieve them. This experience can offer lessons to other sectors.

iii Action2020 is a platform led by the WBCSD for business to take action on sustainable development to 2020 and beyond. More information on the ecosystems aspect of Action2020: http://action2020.org/priority–areas/ecosystems

iv The Consumer Goods Forum (CGF) is a global, parity–based industry network, driven by its members. It brings together over 400 retailers, manufacturers, service providers and other stakeholders across 70 countries. Sustainability information: http://www.theconsumergoodsforum.com/sustainability.aspx

There is growing interest among companies in other sectors with significant biodiversity impacts and dependencies on biodiversity (e.g. agriculture, forestry, water management, tourism, manufacturing) to understand the feasibility and challenges of applying NPI approaches for quantifiable net benefits for biodiversity. Mitigation of biodiversity impacts (beyond regulatory compliance) does occur across various business sectors, but often lacks a systematic approach that includes prioritizing biodiversity values and mitigation options, and defining conservation success.

An NPI approach can offer such a systematic framework that can build on existing efforts to mitigate biodiversity impacts and achieve conservation gains in relevant situations. Taking an NPI approach can serve to highlight key gaps for cost–effective reduction of biodiversity risks at early stages (e.g. avoidance measures), or for the identification and mitigation of significant residual impacts once standard mitigation measures have been completed (i.e. through compensation or offset measures).

1.5 This report is only the beginning of an exploration

This report focuses on the commercial agriculture and commercial forestry sectors (hereafter referred to simply as 'agriculture and forestry sectors'). Specifically, it applies to companies directly involved with primary agricultural and forestry products (e.g. crops and timber) in their value and/or supply chains, either directly via production (i.e. company owns or leases the land) or via sourcing or purchasing policies that can influence production practices.

This report focuses mainly on voluntary efforts companies can take for NPI for biodiversity, and does not include issues related to public policy[v], ecosystem services, or socio–economic conditions. While these are important issues to consider, the working group decided to limit the scope of an already broad topic.

The focus of this report is on biodiversity. However, any strategy designed to improve the condition of habitat and ecosystems should include a consideration of local community views and the range of ecosystem services both required and provided by that habitat. For example, water flows 'through' ecosystems, so activities designed to compensate must pay attention to impacts they may have upstream and downstream on the flow, availability, quality, and access to water resources (see Box 2 for potential NPI application for water management – water is not a focus of this report).

This report is an outcome of an exploratory workshop held by IUCN in October 2013, and subsequent discussions, of a working group of relevant business and conservation experts (see authorship and participation on page ii). The working group was convened by IUCN's Global Business and Biodiversity Programme, in synergy with its work regarding the NPI Alliance (see Box 1). It is the beginning of a sector–specific discussion on the application and challenges of NPI approaches in business sectors with significant biodiversity impacts – a discussion that is urgently needed in light of the CBD's mission of halting biodiversity loss by 2020, and its longer term vision of living in harmony with nature by 2050[13].

This report intends to stimulate new ways of thinking and should not be considered comprehensive, focussing instead on raising relevant issues that will require further investigation. The overall approach of the report is to discuss some key sector–based considerations and a generic NPI approach with five main stages (section 2), then apply this NPI approach to three commonly expected agriculture and forestry scenarios (section 3), and conclude with some initial findings and recommendations for moving forward (section 3).

v As indicated earlier, public policies are one of the drivers for the uptake of NPI goals by business. However, such policies are most often not sector–specific, and are typically focussed on biodiversity offsets and compensatory mitigation programs at national or sub–national scales. Therefore analysis of such policies does not feature in this sector–specific report focussed at a landscape–scale. For detailed analysis of such policies in various regions around the world, see these two reports: ten Kate and Crowe 2014, and Madsen et al. 2010.

Box 1: The NPI Alliance

The Net Positive Impact Alliance – founded by Rio Tinto, Shell, The Nature Conservancy and IUCN – examines how the private sector can reduce its environmental footprint and achieve a net positive impact for biodiversity and conservation globally. The World Bank's International Finance Corporation supports the NPI Alliance in an advisory capacity. The Alliance provides a forum where proponents of the NPI concept can experiment with different approaches and learn from each other, while striving to improve their biodiversity performance. The NPI Alliance will initially focus on the extractives sector (i.e. minerals, oil & gas), where much of the experience on NPI implementation exists today. The NPI Alliance aims to turn the concept of NPI into a common business approach that is scientifically credible and widely recognised by civil society organisations, governments and the private sector.

Box 2: Potential application of NPI for water management*

IUCN's Water Programme cautions that water is far more complex than carbon and deserves more effort than simply transferring carbon metrics into a more complicated natural resource. Using the concept of net positive impact in the complex world of water management, they offer some solutions of what business could offer and how:

1. Define the mission, clearly and transparently, and identify partners that can help you. Water management is no longer about infrastructure – it is about governance, accountability, equity, partnership, economics, and productive clean water services.
2. Set your strategic goals: your baselines, timelines, target claims, and comparable indicators and engrain this in your culture so it survives beyond your current CEO. Make it clear who will measure progress, at what business scale, and when – and disclose it.
3. Better understand the return on investment. The risk of water scarcity to a company's operations is material information that adds value to decision making. Commitments need to follow through targeted investment into the right areas, and not become a corporate advocacy tool.
4. Avoid projects and programmes – integrate approaches throughout the culture of your organisation to support behaviour change in business practices.
5. Invest in where the best water use efficiencies can be made, and where they will have positive and measurable impact. Focussing on water efficiency does not make you positive; it makes you efficient – that's all.
6. Understand and recognise your boundaries. Don't over claim. Water is a complex resource so focus on what you think you can do and deliver on it by understanding the wider water management, social and policy regime you operate in. Local relevance is everything.
7. Use, and learn from how water stewardship is framing the debate and then ask how you connect to the dominant narrative in business and water today – risk and response.

Ultimately, NPI, like shared value, is a term that resonates within business. For water, sustainability practices have to be relevant to people other than just business – because the challenges that really matter are not internal anymore. They are outside business borders in the river basins that provide you with water, and which you supply, operate and sell to.

Dr. James Dalton, Coordinator, Global Initiatives, Water Programme, IUCN
**This is an excerpt from an article originally published in The Guardian in 2013: http://www.theguardian.com/sustainable–business/net–positive–feasible–water*

Section 2: Sector–based Experience and Considerations

In this section:

- Components, and main stages of an organizing framework, for applying an NPI approach
- Experience of the extractives and infrastructure sectors with NPI goals and key challenges
- Initial consideration of key differences in agriculture and forestry
- Building on existing sustainability efforts in agriculture and forestry
- Potential benefits of NPI goals for agriculture and forestry

2.1 Components, and main stages of an organizing framework, for applying an NPI approach

Based on the experience of NPI practitioners and relevant scientific literature, Rainey et al. (2014) provide a useful set of components, or characteristics, of NPI approaches that would increase the effectiveness in benefitting biodiversity and managing business risk. Below (Table 1, next page), we have adapted their table of the justification of these components, with a few additional elements added by the working group.

As previously noted, the identification of appropriate, clear and measurable NPI targets is critical to an NPI approach. We provide the following proposed schematic (Figure 2) and brief description of biodiversity management stages for implementing an effective NPI approach.

Figure 2: The five main stages typically required for implementing an effective NPI approach.

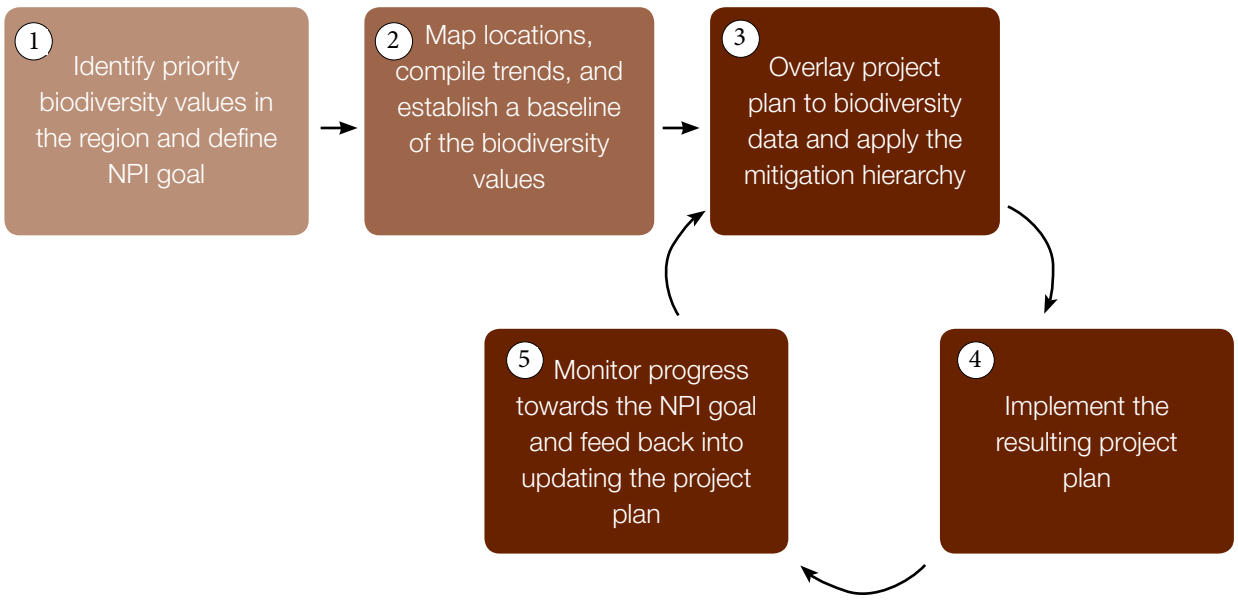


Table 1: Components of an effective NPI approach based on the experience of NPI practitioners and relevant scientific literature.

Components	Justification
1) **Defined biodiversity scope**	Specification of which biodiversity is included, rather than a general mention of 'biodiversity' or 'environment' will focus efforts, increase transparency & improve achievability & measurability (Robinson, 1993; BBOP, 2012). Included biodiversity should encompass both global & local conservation priorities (IFC, 2012). Equivalency (i.e. 'like for like' or 'like for better') is a fundamental aspect of NPI approaches: conservation gains must be at least comparable to the types of biodiversity losses. This is often presented as a like–for–like requirement, but NPI can also provide an opportunity for like–for–better outcomes which would focus compensation efforts on high priority values in the project region (which may not necessarily be present on site) (Quetier & Lavorel 2011).
2) **Defined impact scope**	Specification of which impacts are included will also focus efforts, increase transparency & improve achievability & measurability. As such, goals should ideally address direct, indirect & cumulative impacts. Goals may only include certain types of project or finance; e.g. project finance of USD 10 million or more (Equator Principles, 2013). Goals may retrospectively include existing projects or apply solely to future projects.
3) **Spatial dimension**	Specification of the area of land, typically beyond the project footprint or area directly managed by a company, in which impacts are assessed, and measures designed. To be effective, measures designed to achieve NPI typically have to consider a landscape–scale approach, beyond the area managed by the company (Kiesecker et al. 2010; Gardner et al., 2013).
4) **Measurable goal**	By definition, goals must be measurable in order that the progress towards NNL/NPI can be tracked (BBOP, 2012; Gardner et al., 2013).
5) **Mitigation hierarchy**	Following the mitigation hierarchy (avoidance & minimization of impacts, followed by restoration/rehabilitation, & finally offsets) will optimize reduction of biodiversity impacts & minimize costs (McKenney & Kiesecker, 2010; Quintero & Mathur, 2011; BBOP, 2012). Each step of the mitigation hierarchy should be addressed.
6) **Upper limits to impacts**	NNL/NPI cannot always be achieved: some impacts cannot be offset (BBOP, 2012b; Pilgrim et al., 2013). Goals should acknowledge these upper limits by explicitly outlining impacts that will be wholly avoided; e.g. goals not to develop mines in World Heritage sites (Athanas, 2005).
7) **Appropriate timeframe**	An explicit timeframe for achievement of goals will help management of stakeholder & biodiversity risks (McKenney & Kiesecker, 2010; IFC, 2012; Pilgrim et al., 2013). Earlier action will reduce the risk & costs (Martin et al., 2012). Such a timeframe will have to be determined on a case–by–case basis linked to the timeframe of impacts, and the ecology of individual species (IFC, 2012); e.g. within a generation or migration cycle; within 5 years.
8) **Transparency**	Clear, public disclosure of goals, & progress towards them, optimizes building of stakeholder trust & avoids accusations of 'green–wash' (ICMM, 2010; TEEB, 2010; UNEP–WCMC, 2011; Robinson, 2012). Ideally, disclosed information would be verified by independent third–parties (TEEB, 2010). Reporting could include making data available on target species or habitats for conservation analysis.

This table is adapted from Rainey et al.'s (2014) publication in Oryx entitled 'A review of corporate goals of No Net Loss and Net Positive Impact on biodiversity' (Table 3, pg 5). Full citations of all articles referenced in this table are found in References section of this report.

1 Identify priority biodiversity values in the region and define NPI goal

Stage 1: Identify priority biodiversity values in the project region and define NPI goal

This stage covers key component numbers 1, 3, 6, and 7 (as listed in Table 1).

Main objectives are to:

- Define the biodiversity values (encompassing global to local, and societal conservation priorities) present in the project region (e.g. globally or nationally threatened species, habitats, ecosystems)
- Define a set of measureable biodiversity targets for positive impact within an appropriate timeframe prior to the start of the project →this constitutes the NPI goal

2 Map locations, compile trends, and establish a baseline of the biodiversity values

Stage 2: Map locations, compile trends and establish a baseline of the biodiversity values

Main objectives are to:

- Spatially map the identified biodiversity features (i.e. species, habitats, ecosystems) in the project region
- Compile trends (past, current, and forecasted future conditions) of these biodiversity values
- Establish the baseline condition and trends of the biodiversity values prior to project activities

3 Overlay project plan to biodiversity data and apply the mitigation hierarchy

Stage 3: Overlay project plan to biodiversity data and apply the mitigation hierarchy

This stage includes key component numbers 2, 4 and 5 (as listed in Table 1).

Main objectives are to:

- Define the full scope of unmitigated project impacts on identified biodiversity features
- Overlay planned operations of the project onto the spatially mapped biodiversity data
- Apply the mitigation hierarchy to mitigate the full scope of project impacts through implementing measures in four sequential steps:
    1. Avoid unacceptable impacts to defined biodiversity values (this covers key component number 5 ‘upper limits to impacts’ in Table 1).
    2. Minimise impacts to defined biodiversity values that may occur from project activities.
    3. Restore impacted biodiversity features (e.g. species, habitats, ecosystems) that constitute part of the defined biodiversity values.
    4. Compensate for residual impacts (as the last resort, following implementation of all avoidance, minimisation, and restoration measures) through offsets. This step has two main parts:
        a. an quantified assessment of the residual impacts on defined biodiversity values – this is the compensation liability in order to meet the defined NPI goal of the project; and,
        b. a quantified assessment of possible conservation gains that can at least match, but preferably outweigh the compensation liability – this is the biodiversity offset that, upon adherence to a number of principles and conditions (including limits to offsets, additionality, equivalency, and permanence) and their effective implementation, can result in the achievement of the defined NPI goal of the project.
- Create a project plan based on the outputs of the first two objectives – overlay of project operations and application of the mitigation hierarchy.

4 Implement the resulting project plan

5 Monitor progress towards the NPI goal and feed back into updating the project plan

Stages 4 and 5: Implement the project plan, and monitor progress towards the NPI goal

Stages 1 to 3 generate the project plan for achieving the NPI goal and occur in a linear manner, as shown in Figure 2. The main objective of stage 4 is to implement the project plan, and of stage 5 is to monitor its progress towards achieving the NPI goal. These two stages are circular in manner as the project plan (including the application of the mitigation hierarchy) will in most cases need to be updated as implementation proceeds with feedback from monitoring how effective the project plan is towards achieving the NPI goal. These two stages should occur simultaneously so that the project plan can be adapted based on the monitoring results.

Experience in the extractives and infrastructure sectors shows that NPI approaches can only be effective when looking at the wider ecological landscape[14] and success is generally more likely where the development project has a clearly defined spatial footprint within the landscape[15]. A landscape perspective is essential for several reasons:

- To understand the regional significance of biodiversity on the basis of patterns of irreplaceability, vulnerability and socio–economic and cultural biodiversity values;
- To understand the distribution of biodiversity and development activities in order to identify opportunities for securing additional and ecologically viable biodiversity gains, and hence to determine the most appropriate set of offset activities and locations (and where development activities should be avoided completely because they cannot be offset); and,
- To identify and address risks to the long–term maintenance of biodiversity gains in offset design and implementation[16].

The five stage process is proposed as an organising framework for business project developers interested in applying NPI approaches systematically and from a landscape perspective. The framework is not sector–specific so it can adapt to differences between sectors, and build on relevant ecological sustainability efforts that are ongoing in different sectors. The remainder of Section 2 will briefly discuss the NPI experience and challenges of the extractives and infrastructure sectors, key differences of the agriculture and forestry sectors, and relevant sustainability efforts in these sectors that an NPI approach could build on.

2.2 NPI experience in the extractives and infrastructure (E&I) sectors

Some development projects in the extractive[vi] (particularly mining) and infrastructure[vii] sectors have been at the forefront of testing the NPI approach to date. Such projects tend to have spatially and temporally defined footprints within landscapes with priority biodiversity values, and face considerable public scrutiny. For example, the Rio Tinto Group (a multinational metals and mining corporation) has several priority mining development projects with NPI goals to be achieved before, or by closure of, the mining operation. Their approach is based on applying the mitigation hierarchy by "avoiding unacceptable impacts to biodiversity, reducing the impacts that may occur, restoring impacted ecosystems, compensating for residual impacts through offsets, and seeking additional opportunities to contribute to local conservation."[17] A brief illustration of this approach at an ilmenite mining operation in south–east Madagascar is provided in Annex 1. Detailed accounts of the mining sector's experience with NPI have been published elsewhere[viii].

Similarly, major built infrastructure projects typically have spatially and temporally defined footprints that permit the assessment of direct impacts from the project on biodiversity, and identification of measures to mitigate risks of those impacts such that NPI goals can be established.

A brief illustration of an NPI approach in the development of a transport corridor in France is provided in Annex 3. Some built infrastructure projects (such as transport corridors and power lines) can be a substantial component of major extractive projects, particularly in frontier areas with potential for significant biodiversity risks.

While the working group acknowledges initiatives undertaken by the E&I sectors to develop and implement NPI approaches, we do not intend to minimize the significant challenges that remain even for these sectors. Fundamental challenges include: assessing appropriate baselines and evaluating achievement of goals, greater adherence to the mitigation hierarchy, achieving effective stakeholder engagement, better integration of societal biodiversity conservation priorities, better public policy frameworks that address governance gaps, and achieving effective implementation of offsetting systems, are ongoing issues for all sectors. More specific to the E&I sectors, there are some technical challenges to address such as: the potential for linear infrastructure (e.g. transport corridors) to create barriers for wildlife that exacerbate fragmentation caused by other more localized impacts, or the impact of roads that open up access to frontier areas which can transform landscapes beyond anticipated buffer zones in unpredictable and exponential ways[ix].

Indeed, considerably more practical experience and scientific research is needed to develop effective mechanisms for NPI approaches in different types of infrastructure and extractive projects. But the working group agreed that there is sufficient existing knowledge and experience in these sectors to explore its application to agriculture and forestry.

vi Minerals, mining, oil and gas extraction

vii Such as roads and railways, port facilities, housing developments, energy facilities, pipelines and power transmission lines.

viii See, for example, ICMM 2010; Temple et al. 2012; BBOP Pilot Projects 2009-2014; Globalbalance and The Biodiversity Consultancy 2014.

ix See for example: Global Road Map - A strategic approach for zoning and planning roads: http://www.global-roadmap.org/publications/

Figure 3: Sectors that are a threat factor to total number of globally threatened species

Number indicates Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) Species based on IUCN Red List data (2015)[x]

x Numbers were determined by conducting a search of all globally threatened species for which these sectors show up as threats, using the more detailed search option on the IUCN Red List website: http://www.iucnredlist.org/ (accessed January 2015)

2.3 Key differences regarding biodiversity impact mitigation between the agriculture and forestry (A&F) sectors, and the extractives and infrastructure sectors.

Globally, A&F sectors have a substantially higher impact and more permanent impact on biodiversity than the E&I sectors (see Figure 3 for one indicator). The spatial and temporal scales of this impact, the opportunities to divert A&F development onto ecologically degraded lands, the economics of production, and the number of producers required to achieve scale at landscape levels, all have significant implications for the potential application of NPI approaches in these sectors. These are some of the key differences between A&F and E&I sectors to consider in terms of impact mitigation. Table 3 (next page) discusses these differences in more detail, and also notes where some issues may be similar or case–specific (as the differences are not necessarily clear cut). It is important to note the following about Table 3:

- It is an initial list that emerged out of discussions in the working group.
- For the scope of this initial comparison, A&F are considered together, as well as E&I sectors. This can result in some broad generalisations – where there are clear exceptions with regards to a sector these have been noted.
- The comparison is focussed on generally expected situations in commercial agriculture and forestry operations as well as supply chains, and commercial extractive and infrastructure operations.

In sum, Table 3 shows the following key differences of agriculture and forestry sectors compared to the extractives and infrastructure sectors (with exceptions as noted in the table):

1. Spatial scale of impacts: generally larger landscape–level for A&F, smaller site–level for E&I.
2. Temporal nature of impacts: generally more dynamic for A&F, more static for E&I.
3. Use of ecologically degraded land: more opportunities for A&F, less for E&I.
4. Land managers involved: generally more diverse for A&F, less diverse for E&I.
5. Economics and financing: generally lower profit margins per area of impact, and limited exposure to foreign capital with NNL and NPI requirements for A&F; for E&I, generally higher profit margins per area of impact, and much more exposure to foreign capital with NNL and NPI requirements.

These key differences suggest some comparative opportunities and risks, in general, for A&F sectors when considering the potential application of NPI approaches:

Opportunities:

- There are more impact avoidance options available, as areas suitable for agriculture and forestry are vast, compared with extractive industries where the resource is highly localised. Avoidance measures are the simplest and cheapest form of biodiversity impact mitigation.
- There are more ecologically degraded areas globally for A&F sectors to utilise for production, compared to E&I sectors which are limited to locations based on mineral deposits or infrastructure needs. Although using such areas can require significant additional investments, once such areas become productive, benefits can include the return of ecosystem functionality and the avoidance of expansion of A&F activities into natural areas.

Table 2: Initial list of key differences between agriculture and forestry sectors compared

Key Differences	Agriculture and forestry (A&F) sectors	Extractives and infrastructure (E&I) sectors
Spatial scale of impacts	Operations: generally, larger spatial footprint with larger area of direct impact at the landscape–level. Supply chain: individual supplying farms or woodlots may have a small spatial footprint with small areas of direct impact, but cumulative impacts (such as across a supplier landscape) can be large.	Generally, smaller spatial footprint with smaller area of direct impact at the site–level.
Temporal nature of impacts	Generally, existing A&F land can be more dynamic in terms of biodiversity patterns (i.e. characterized by change over time) – for e.g. both sectors involve the management of biological resources that can host some wildlife. Particularly for forest areas, harvesting can often take place in portions of the landscape in a cycle that always maintains some of the forested area, and can provide valuable landscape heterogeneity. A&F land could be less complex to restore to a more natural state due to this dynamism and presence of biodiversity.	Generally, E&I land can be more static in terms of biodiversity patterns – e.g. both sectors typically involve transforming natural areas by complete removal (mining) or with built systems (infrastructure) that often host no (or very limited) wildlife. E&I land could be more complex to restore to a more natural state due to this static nature.
Opportunities to use ecologically degraded lands	A&F sectors have far more opportunities for using ecologically degraded areas through their restoration for productive purposes[xi] instead of expanding into natural areas.	E&I sectors have fewer opportunities to use ecologically degraded land because mineral resources and infrastructure needs are most often highly localised and independent of the state of natural cover on the land.
Number of land managers involved	In many cases, landscapes with agricultural and forestry operations can have a diverse range of land managers (e.g. from smallholders to large–scale managers), as well as other stakeholders such as resident communities who may be in the management area. Coordinating mitigation efforts among diverse stakeholders can be more complex and can make outcomes less certain.	In many E&I cases, sites can be under the direct control of one or a few companies. One or a few major land managers can make coordination of mitigation efforts simpler and provide greater certainty to their outcomes.
Economics and financing	Generally, agriculture companies and suppliers have relatively lower net economic profits per area of impact (compared to extractives), which provides fewer financial resources for mitigation efforts[18]. Many agricultural and forestry companies do not need access to foreign capital – thereby they are not influenced by NNL and NPI requirements of IFC Performance Standard 6 or similar financial sector policies.	Generally, extractive companies have relatively high net economic profits per area of impact (compared to e.g. agriculture) allowing them to aim for positive impacts from mitigation efforts rather than just reducing negative impacts19. In many cases, extractive and infrastructure companies need access to foreign capital – thereby influenced by NNL and NPI requirements of IFC Performance Standard 6 or similar financial sector policies.

xi Globally, there are over 1.5 billion hectares of land in temperate and tropical areas that are suited for 'mosaic restoration', in which forests and trees are combined with other land uses, including agroforestry and agriculture (Minnemeyer et al. 2011).

to extractives and infrastructure sectors, in terms of impact mitigation considerations.

Notes on situations that may be similar between these sectors or case–specific
In some E&I cases – e.g. direct impacts from mining effluents, or road building over a large area – direct impacts could also be large. In some industrial mining cases there can be potential for significant cumulative impacts – for e.g. if mineral deposits are highly localised in particular landscapes or regions, with many companies involved in their extraction. In some forestry cases – e.g. selective logging over large areas – there could be smaller areas of direct impact that are less significant at a landscape–scale. Indirect impacts are less obviously different between these sectors and will be case–specific. For e.g. a new mine with a large workforce and new infrastructure (such as roads, power lines, ports) could have substantial indirect impacts over a larger area than an extensive forestry operation with a small workforce, or existing farmed or forested areas which typically do not require new infrastructure requirements.
For agriculture, if natural habitat conversion is involved, permanent alteration of the landscape often occurs reducing the dynamism compared to the original situation. However, in some agriculture cases, alteration may be reversed due to abandonment of farms and subsequent natural regeneration. For forestry, in some cases, permanent alteration of the landscape can occur as well – particularly in tropical areas – usually due to conversion for agriculture or replacing natural forest with plantations. In a few mining cases, sites may be rehabilitated thereby becoming less static and more natural. Note that rehabilitation requirements are not common, can take time to occur (sites can be in operation for 50–100 years), and the rehabilitated sites may still be ecologically different and less dynamic compared to the original natural area.
However, establishing A&F operations in degraded lands can face several challenges including the lack of infrastructure and significant investments in improving the fertility or soil structure of the land. In the E&I sectors, some mining activities can take place in ecologically degraded areas if they overlap with mineral deposits – after mining is completed, appropriate rehabilitation of the area to improve ecosystem functionality and the local state of biodiversity can occur.
In some A&F cases there could also be fewer land managers and other stakeholders involved – for e.g. land managed by one or a few companies, or suppliers with large land holdings in remote or unpopulated areas. Many E&I cases, particularly mining, can often generate more complex issues with stakeholders – e.g. potential displacement of indigenous peoples or other resident communities – even if there is one or a few land managers involved.
Some agriculture and forestry companies – for e.g. large scale commodity production such as palm oil – may need access to foreign capital and could thereby be influenced by NNL and NPI requirements of IFC Performance Standard 6 or similar financial sector policies.

- Restoring natural areas in A&F land is typically less complex than in E&I land, due to its capacity to host some native biodiversity and some natural areas during operations, thereby potentially making restoration measures take less time and be more cost–efficient.

Risks:

- Mitigation measures in A&F sectors may often need to be deployed across large landscapes (given the typically larger spatial scale of A&F operations) and may involve a diverse range of farm and woodlot managers (land managers), which could make an NPI approach more complex. However, many commercial A&F situations do not involve a diverse range of land managers (e.g. where the land is owned or leased by a company); and where they do, companies can have a strong coordinating influence across land managers through sourcing requirements.
- There are typically fewer financial resources available to invest in biodiversity impact mitigation for positive impact due to the economics of production. However, in some cases, fewer financial resources may actually be required given some of the cost–saving advantages described above (i.e. more avoidance options, more ecologically degraded areas available, and potentially more cost–efficient restoration measures). And, some A&F commodities are earning higher prices if certified to be sustainable according to production standards designed to improve environmental and social management beyond regulatory compliance (see next sub–section).

This initial comparison suggests that, while there are some key differences between the A&F and E&I sectors in terms of impact mitigation, they are not necessarily barriers to the potential application of NPI approaches in A&F sectors. This is especially the case in situations with clearly defined spatial footprints through company operations (i.e. large areas or landscapes that companies own or lease) or sourcing regions. In both situations companies must be able to either directly implement mitigation measures or influence their suppliers of primary A&F products to do so. The next sub–section considers ongoing efforts of the A&F sectors to improve the mitigation of their biodiversity impacts in order to assess how potential NPI approaches can build upon them.

2.4 Sustainability standards currently serve as a mechanism by which A&F sectors are improving their biodiversity management, but there are some key gaps from an NPI perspective.

Leading actors within the commercial A&F sectors have been promoting sustainable production for improved environmental and social management since the 1990's, significantly predating current NPI efforts by the E&I sectors. This has been primarily via sustainability standards and certification schemes [20] (hereafter referred to simply as standards), and to a lesser extent, individual voluntary commitments. Examples include the Forest Stewardship Council (FSC) and Sustainable Agriculture Network (SAN) standards, and numerous commodity–specific (e.g. palm oil, soy, sugar, coffee, cocoa, biofuels) standards typically developed through multi–stakeholder processes. Such standards enable traders, consumer goods companies and retailers to promote best practices for biodiversity conservation and mitigate negative impacts from production within their supply chains. These standards often exceed minimum regulatory requirements and typically results in a higher price paid to the producers (range is from 1% to 77% higher[21]). Such standards are also favoured by IFC PS6 for providing finance to A&F projects implementing best or responsible practices, although this doesn't include NPI goals.

While these standards all include biodiversity components and many are increasing their global market share annually, they have varying requirements to safeguard biodiversity, and most certified A&F commodities are currently a small proportion of global production[xii]. A review of 16 standards in the A&F sectors showed that although all include requirements for the protection of habitat, species and priority conservation areas[xiii], there is a lack of consistency in how these are defined and what measures should be adopted to safeguard them. For instance, most (8 out of 12) agriculture standards do not consider priority conservation areas beyond legally protected areas; but most (3 out of 4) forestry standards do. And, none of the standards follow the mitigation hierarchy completely or include NNL or NPI approaches explicitly[22]. The review makes a number of recommendations to address these inconsistencies, including: to use internationally recognised definitions for biodiversity components, to apply the mitigation hierarchy fully, and to integrate NNL/NPI approaches, as linked to the objectives and decisions of the CBD[xiv].

Current versions of A&F sector standards typically include requirements to conserve remaining natural habitat on the farm, prohibit hunting and collecting of threatened species, and protect watercourses through natural buffers, to name a few. As such they tend to emphasize implementation of responsible management practices on–site (e.g. responsible agrochemical use, water and soil use, waste management) rather than the achievement of defined conservation goals at a landscape level. There is currently little quantified evidence on the biodiversity conservation impact of such standards implemented in the agriculture sector, and limited evidence in the forestry sector[23]. Evidence is mostly limited to changes in management practices at the farm– or woodlot–level resulting from certification, and their anticipated benefits to biodiversity values on–site[xv]. The potential for standards to contribute to biodiversity conservation at landscape and regional levels in the longer term is therefore still largely unknown, but there are ongoing efforts to improve this via new methodological frameworks proposed for evidence–based evaluations for both sectors[xvi].

An important conservation concept integrated in some agriculture and most forestry standards is the High Conservation Value (HCV) approach (see Box 3 (next page) for examples of standards). HCVs are biological, ecological, social or cultural values which are considered outstandingly significant or critically important, at the national, regional or global level[24]. The six High Conservation Values cover a broad array of conservation priorities (see Box 3 for value definitions) shared by a wide range of stakeholder groups. In any management plan, from forest to agricultural site management, any identified HCVs need to be maintained or enhanced. The HCV approach was originally conceived for the FSC standard which emphasizes the management and maintenance of HCV forests within timber concessions globally, but is now widely used in other sustainability standards (forestry, agriculture and aquatic production systems) as well as referenced in IFC PS6 Guidance, and more generally for resource use and conservation planning (and more recently to define high carbon stock forests and their avoidance)[25].

xii Compliant production as a percentage of global production of some A&F commodities as of 2012: soy 2%, sugar 3%, forest products 9%, tea 12%, palm oil 15%, cocoa 22%, and coffee 40%. Source: Potts et al. 2014.

xiii Defined as "…sites of particular biodiversity importance that have been identified by NGOs, and academics, based on different criteria. Governments, communities and financial institutions/investors are frequently also involved in the prioritisation process. While these areas sometimes overlap with protected areas, and therefore have a management regime in place, the remainder are often unprotected and unmanaged." Priority conservation areas analysed in the report: Key Biodiversity Areas, Alliance for Zero Extinction sites, Important Bird Areas, High Conservation Value Areas. (UNEP–WCMC & CBDS 2011)

xiv A subsequent report from UNEP–WCMC and CBD Secretariat builds on these recommendations and provides best policy guidance to facilitate further improvements in standards systems with regard to biodiversity and ecosystem service safeguards. (SCBD and UNEP-WCMC 2012)

xv See Gullison 2009; van Kuijk et al. 2009; Blackman and Rivera 2010; Romero et al. 2013; COSA 2013

xvi See Milder et al. 2012; Romero et al. 2013; Milder et al. 2015 ; Tscharntke et al. 2015

Box 3: High Conservation Value (HCV) Approach

Table below reproduced from the HCV Resource Network's 2014 publication entitled 'Common Guidance for the Identification of HCVs' (pg 7, table 1):

Certification Standard	Explicit use of "HCV"	Supporting Principles
Forest Stewardship Council (FSC)	• Principle 9 High Conservation Values	• Principle 3 Indigenous Peoples' Rights • Principle 4 Community Relations • Principle 6 Environmental values and impacts
Roundtable for Responsible Palm Oil (RSPO)	• Principle 5 Environmental responsibility and conservation of natural resources and biodiversity • Principle 7 Responsible development of new plantings (respecting local people's land and conserving primary forest and peat lands)	• Principle 1 Commitment to transparency • Principle 2 Just land acquisition • Principle 6 Responsible consideration of employees and of individuals and communities affected by growers and mills
Bonsucro (sugar)	• Principle 4 Actively manage biodiversity and ecosystem services • Principle 5 Continuously improve key areas of business	• Principle 1 Obey the law • Principle 3 Manage input production and processing efficiencies to enhance sustainability
Roundtable for Responsible Soy (RTRS)	• Principle 4 Environmental responsibility	• Principle 3 Responsible community relations • Principle 5 Good agricultural practices

Source: https://www.hcvnetwork.org/resources/cg–identification–sep–2014–english

The six categories of HCVs are:

HCV1 – Species diversity: concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.

HCV2 – Landscape–level ecosystems and mosaics: large landscape–level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

HCV3 – Ecosystems and habitats: rare, threatened, or endangered ecosystems, habitats or refugia.

HCV4 – Ecosystem services: basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.

HCV5 – Community needs: sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples identified through engagement with them.

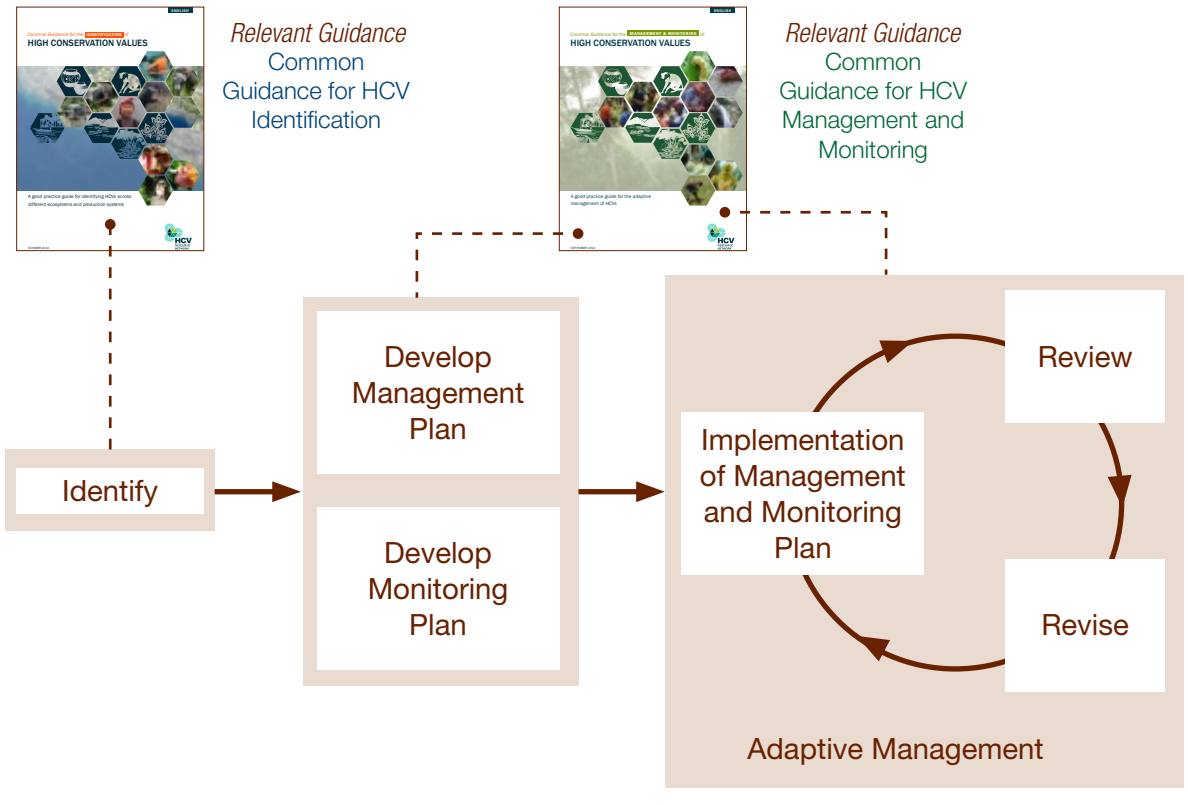
HCV6 – Cultural values: sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with them.

Source: https://www.hcvnetwork.org/about–hcvf/the–six–high–conservation–values

Figure below reproduced from the HCV Resource Network's 2014 publication entitled 'Common Guidance for the Management and Monitoring of HCVs' (pg 4, figure 1):

"Illustration of the HCV process including identification, management and monitoring. Management and monitoring are linked through adaptive management for the long–term conservation of HCVs."

Figure 4: The HCV Process



Source: https://www.hcvnetwork.org/resources/cg–management–and–monitoring–2014–english

Despite being widely used as a conservation tool in A&F production landscapes, there is limited scientific evidence of the HCV approach having an impact on biodiversity conservation, particularly in the agriculture sector[26]. And, the few scientific publications that do exist[xvii] argue that, as currently conceived, the HCV approach provides insufficient protection for biodiversity in tropical agricultural landscapes. One criticism is that criterion HCV2, which provides blanket protection to forests, only protects large expanses of habitat (≥20,000–500,000 ha, depending on the country). So, in the absence of other HCVs being identified in tropical landscapes suitable for agriculture, the collective clearing of forest patches below these thresholds could result in extensive deforestation[xviii]. Given the integration of the HCV concept in standards for timber and major commodity crops that are rapidly expanding in the tropics (e.g. palm oil, soy, sugarcane, cacao[27]), these deficiencies need to be urgently addressed. A strategy has been proposed by the HCV Resource Network recently, for better knowledge exchange between scientists, policy makers, and HCV users, sharing of information, and consideration of the practical constraints within which HCV users and commodity producers operate[28].

HCV–based standards do not set NPI goals and are not designed to specifically incorporate an NPI approach but, given its conservation aims and prevalence in A&F standards, it can certainly serve as a useful existing mechanism to build an NPI approach upon. The HCV process of identifying conservation values, designing management and monitoring plans, and their adaptive implementation (see Box 3 for the main stages of the HCV process) is quite similar to the five stage process of an NPI approach proposed in this report. For instance, identified HCVs in a particular A&F situation could be selected as potential NPI goals. Then, designing and implementing an HCV management plan that achieves the maintenance or enhancement of these HCVs (with quantified evidence) could be considered part of an NPI approach.

The HCV concept focuses on the identification of priority conservation values and can therefore aid in stage 1 of the five stage process of an NPI approach. All development activities must be avoided in HCV areas as they are typically irreplaceable and therefore impossible to offset (invoking the 'limits to offsets' core principle). The NPI approach would add the restoration and compensation steps of the mitigation hierarchy, which are typically absent or emphasised less than avoidance and minimisation measures in standards within which the HCV concept is integrated. Building an NPI approach upon these standards could also potentially address some gaps in how HCVs are required to be managed, including: 1) quantified evidence of conservation impact – as any NPI claims would have to be based on robust evidence; 2) application in tropical agricultural landscapes – as the biodiversity and impact scope (key component numbers 1 and 2 in Table 1) would include consideration of natural habitat patches that provide conservation value in the landscape context (even if below thresholds defined in criterion HCV2); and, 3) emphasis on applying the full mitigation hierarchy including restoration and compensation steps.

As referenced earlier, via the Consumer Goods Forum (CGF) over 400 of the world's largest retailers have pledged to achieve 'zero net deforestation' (see glossary for deforestation definitions) in their commodity supply chains by 2020, including for palm oil, soy, beef, paper and pulp. One of the main ways in which CGF currently promotes the implementation of this commitment is by emphasising sourcing of commodities certified by relevant commodity standards, all of which integrate the HCV approach. However, given some of the key conservation gaps in standards discussed here, and the

xvii See Edwards et al. 2010, 2011, 2012; Edwards & Laurance 2012

xviii The main reason cited by Edwards et al. (2012) for the inadequacy of the HCV approach when applied to tropical agricultural landscapes is that the conversion of a tropical forest to palm oil, soy, sugarcane or cacao results in a dramatic loss of forest specialist species. In comparison, a selectively logged forest (or even heavily logged in portions) can retain much of its biodiversity across a landscape. They recommend the development of a new HCV criterion that recognizes the conservation value (including connectivity) of habitat patches within the agricultural matrix and that protects patches above 1,000 ha. They argue that without such a consideration, there is a risk that agricultural producers could cause extensive deforestation in tropical landscapes for commodity production and still receive certification that the crop is sustainable. However, HCV guidance recommends that even when HCVs are not present, valuable sites should be responsibly managed in compliance with the overall standard that the HCV concept is integrated within (see Box 3, Table 1 excerpt).

Box 4: Tropical Forest Alliance – Reducing Commodity–Driven Deforestation

Mission: TFA 2020 is a public–private partnership in which partners take voluntary actions, individually and in combination, to reduce the tropical deforestation associated with the sourcing of commodities such as palm oil, soy, beef, and paper and pulp. The Alliance does so by tackling the drivers of tropical deforestation using a range of market, policy, and communications approaches.

Goal: TFA 2020 will contribute to mobilizing and coordinating actions by governments, the private sector, and civil society to reduce tropical deforestation related to key agricultural commodities by 2020.

Cross–Cutting Objectives: TFA 2020 and its Partner countries, companies and civil society organizations work together to:

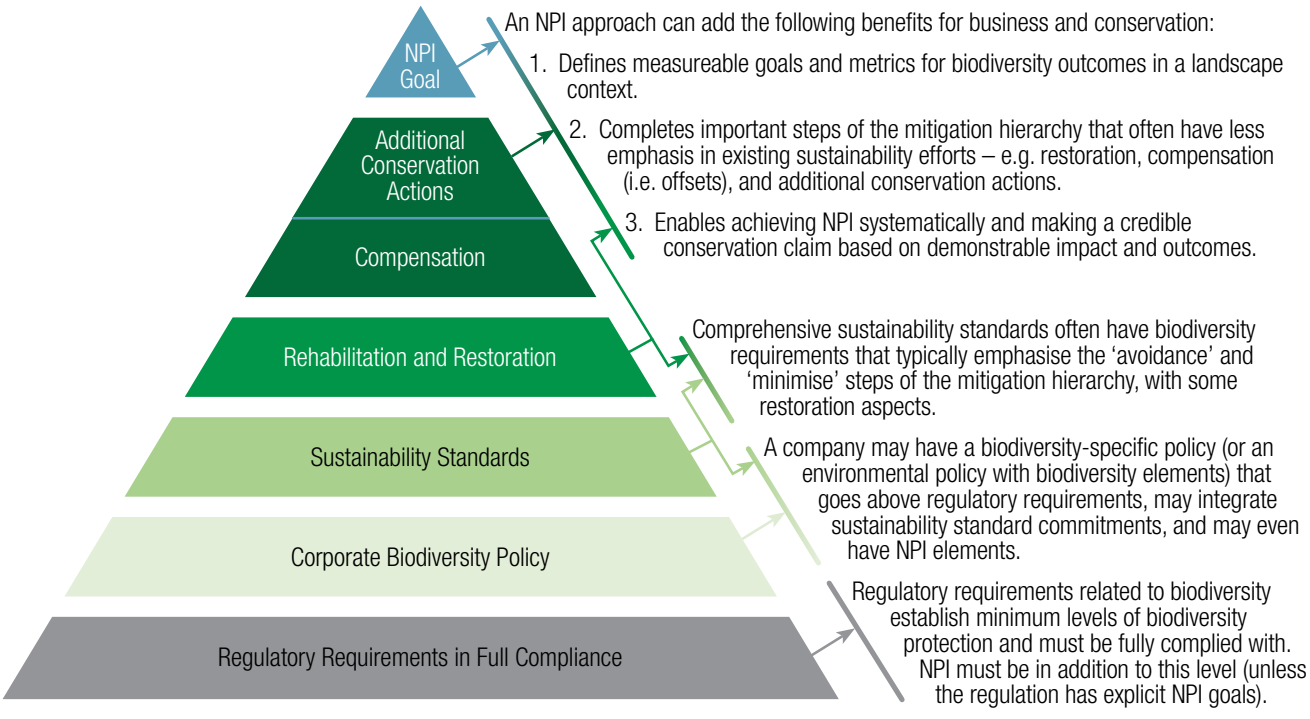
- Improve planning and management related to tropical forest conservation, agricultural land use and land tenure.
- Share best practices for tropical forest and ecosystem conservation and commodity production, including working with smallholder farmers and other producers on sustainable agricultural intensification, promoting the use of degraded lands and reforestation.
- Provide expertise and knowledge in order to assist with the development of commodity and processed–commodity markets that promote the conservation of tropical forests.
- Improve monitoring of tropical deforestation and forest degradation to measure progress.

Source: http://www.tfa2020.com/

inability of the A&F sectors to determine past performance before the production entity was verified, implementing standards alone will not ensure deforestation risks are fully addressed. As an indication of this, CGF's commitment has catalysed the creation of the 'Tropical Forest Alliance' (TFA) (see Box 6) which is engaging relevant companies, civil society organizations, and governments (in both producer and consumer countries) to help achieve zero net deforestation in tropical forest countries by 2020. TFA was developed to respond to this challenge and other key issues related to tropical deforestation – for e.g. the need for additional leverage and financing to achieve change at scale.

Thus, standards in the A&F sectors can provide a useful basis upon which to build an NPI approach, including the identification of priority conservation values through the HCV concept, and ensuring traceability across supply chains from farm or forest site to the end product. Traceability is essential in order to make an accurate NPI claim on the product, particularly in complex supply chains that often exist in the A&F sectors. It is important to re–iterate that sustainability standards on their own are useful mechanisms for improving biodiversity management and traceability in A&F supply chains, particularly for the avoidance (e.g. of HCV areas) and minimisation (e.g. through responsible A&F practices) of significant negative impacts. Standards enable A&F companies to identify parts of their supply chains where biodiversity performance is good, or may need to be improved, or where performance is poor and sourcing should therefore be avoided. The intent of analysing standards here is not to assess their overall value but rather to understand their potential utility for the application of NPI approaches.

Figure 5: Benefits that an NPI approach can add to current sustainability efforts in agriculture and forestry sectors



While standards do include biodiversity components, mitigation mechanisms, and traceability processes, some key gaps exist from an NPI perspective:

- Less emphasis on biodiversity conservation at the landscape–level, compared to the site–level.
- Lack of clearly defined goals for positive biodiversity impact (for e.g. particularly if no HCVs are identified in a given landscape).
- Incomplete application of the mitigation hierarchy: standards typically emphasise avoidance and minimisation steps of the mitigation hierarchy, but have limited emphasis on the restoration step, and virtually no emphasis on the compensation step.
- Gaps in the management requirements of the HCV concept in terms of consistent quantified evidence for positive impact, and potential risk of deforestation of smaller, yet valuable, natural habitat patches in tropical agricultural landscapes.
- Lack of a robust evidence base of the conservation impact of HCV–based standards particularly for agriculture.

Applying an NPI approach to relevant A&F situations where standards are being used can begin to address these gaps.

2.5 An NPI approach can build on sustainability efforts in the A&F sectors

The application of the five stage process for an NPI approach to A&F situations where standards (or similar mechanisms based on standards such as corporate sourcing policies) are being used can contribute to addressing some key gaps in terms of biodiversity impact assessment by:

- Defining time–bound quantifiable NPI goals (that would include HCVs, but also consider other values when HCVs are absent, such as forest patches in an agricultural matrix).
- Applying all steps of the mitigation hierarchy from a landscape perspective.
- Compiling robust evidence to assess progress towards NPI goals and conservation impact, including measuring change against a baseline or reference frame, and making more defined conservation claims.

An NPI approach for the A&F sectors does not have to build only on sustainability standards. It can also build on other sustainability efforts such as company policies or processes related to biodiversity management, and build on relevant sector or thematic initiatives such as the CGF's zero net deforestation initiative. Figure 2 provides a simple visualisation of the benefits that an NPI approach could add to current sustainability efforts in the A&F sectors – with all efforts being built on the foundation of full compliance with all biodiversity related regulatory requirements.

Section 3: Applying the NPI Approach

In this section:

- Applying the mitigation hierarchy to A&F sectors
- Applying the NPI approach to three A&F scenarios
- Discussion, initial conclusions and next steps

3.1 All steps of the mitigation hierarchy are applicable to A&F sectors

To understand what the application of the five stage process for an NPI approach could look like for the A&F sectors, it is useful to start with what the application of the mitigation hierarchy could imply in terms of possible A&F interventions. Table 4 (next page) presents the objectives of each step of the mitigation hierarchy and some initial examples of possible interventions (not an exhaustive list). The three scenarios that the five stage process will be applied to are then briefly described, followed by a schematic for each scenario.

3.2 An NPI approach illustrated in three common A&F scenarios

Based on the possible interventions identified above, the five stage process for an NPI approach is applied to three commonly expected scenarios in the A&F sectors. The scenarios are a hypothetical exercise to illustrate what an NPI approach in the A&F sectors could look like. It is important to emphasise that these scenarios are an initial exercise and do not provide a detailed roadmap for real world situations. The scenarios are based on three broadly applicable landscape types:

1. Existing managed land with a majority of modified habitat: refers to landscapes of already cultivated/ managed lands where the project has or will initiate improvements in biodiversity management.
2. New legally authorised concessions in areas with a majority of natural habitat: refers to landscapes where a new tract of land with a majority of natural habitat has been legally authorised for agricultural or forestry development.
3. Landscapes with ecologically degraded areas: refers to landscapes where the agricultural or forestry operations are or will be focussed specifically within ecologically degraded areas.

The two main habitat categories – modified and natural habitat – are defined based on IFC Performance Standard 6 definitions, so as to make use of existing definitions recognised by both conservation and business communities:

- 'Modified habitats' are defined as "areas that may contain a large proportion of plant and/or animal species of non–native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands." It is important to note that this definition "excludes habitat that has been converted in anticipation for the project."
- 'Natural Habitats' are "areas composed of viable assemblages of plan and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition." [30]

IFC Performance Standard 6 considers degraded areas as a subset of modified habitat. In order to demonstrate the potential opportunity that degraded areas could present for applying NPI approaches, the term 'ecologically degraded areas' is used here and considered separately from modified habitat (but is essentially an extreme example of modified habitat). Ecologically degraded areas are defined here as lands undergoing significant reduction or loss in the biological or economic productive capacity of the land caused by human activities from which the land cannot recover unaided, and is exacerbated by natural processes and often magnified by the impacts of climate change and biodiversity loss[31]. This definition is provided in order for

Table 3: Implications of the mitigation hierarchy in terms of possible A&F interventions for impact mitigation and NPI approaches.

	Mitigation Hierarchy Steps and Objectives[29]	Possible Interventions for A&F Sectors
Step 1: Avoid	**Objective**: to prevent or avoid negative impacts to identified priority biodiversity values (which feature in the NPI goals) in the first place, particularly in those areas where the values once lost, cannot be restored, replaced or otherwise compensated for. Avoidance measures can be broadly categorised as: 1. Area–based: avoidance of any business operations or activities in delimited areas with the priority biodiversity values; and, 2. Practice–based: the avoidance of business practices that have impacts on the priority biodiversity values. Avoidance measures are often the easiest, cheapest and most effective interventions to avoid impacts from the outset.	Avoidance is already considered in most A&F sustainability standards. Avoidance options would include: 1. Area–based approaches such as avoidance of HCV areas or other priority conservation areas areas (e.g. through set–asides) on what would otherwise be productive land. Set–asides established off–site could qualify as compensation measures or offsets. 2. Practice–based approaches such as avoiding the use of hazardous chemicals known to have direct impacts on species or habitats of priority biodiversity value in the landscape (particularly relevant to agriculture), and avoiding logging operations during certain seasons or the clearing of particular habitat features (e.g. deadwood) known to have impacts on species or habitats of priority biodiversity value.
Step 2: Minimize	**Objective**: to minimise the impacts of unavoidable operations to identified biodiversity values. The focus of this step is to adopt good business practices within all operations in order to reduce the duration, severity, and extent of impacts on the priority biodiversity values. Minimise measures can be broadly categorised as: Area–based: create buffer zones around avoided areas (from step 1), and maintain or enhance corridors and stepping stones for connectivity between these avoided areas in order to minimise fragmentation of habitats of priority biodiversity value. Practice–based: implement business practices that reduce the duration and severity of impacts.	Minimisation is already considered in most A&F sustainability standards. Minimise options would include: 1. Area–based approaches such as creation of buffer zones (with reduced disturbance activities compared to operational zones) around avoided areas, and the maintenance or enhancement of set–aside natural corridors and stepping stones for connectivity between avoided areas within the agricultural or forestry landscapes. 2. Practice–based approaches could include adoption of good practices such as integrated pest management and targeted application of chemicals (particularly relevant to agriculture), and adoption of logging practices (e.g. selective logging) that minimise impacts upon the priority biodiversity values.
Step 3: Restore	**Objective**: to initiate a long–term process of regaining ecological functionality and enhancing human well–being in deforested or degraded areas that contribute to the maintenance or enhancement of the identified biodiversity values.	Restoration measures could include replanting plant species of priority biodiversity value, or of plant species that contribute to the maintenance/enhancement of the priority biodiversity values and enhance human well–being (e.g. riparian areas that improve water availability for nature and humans). From a broader perspective, this step could include rehabilitation or restoration measures that increase landscape heterogeneity, and associated biodiversity benefits. In particular, reinstating heterogeneity in landscapes dominated by vast areas of intensively managed, structurally simple monocultures can have clear benefits for biodiversity. Off–site restoration actions could qualify as compensation measures or offsets.

Step 4: Compensate or offset	**Objective**: to compensate off–site for residual impacts on identified biodiversity values remaining after implementation of steps 1–3. Biodiversity offsets are generally of two main types: 1. 'Restoration offsets' which entail restoring, enhancing or establishing the biodiversity values in degraded habitats outside the area directly managed by the project or company, and 2. 'Protection offsets' (also known as 'averted loss offsets') which aim to remove or reduce threats that cause degradation or loss of the biodiversity values (e.g. future degradation or loss of species or habitats of priority conservation concern from threats such as habitat conversion, hunting, invasive species) by removing or reducing threats in areas where this is ongoing or predicted, but not including impacts by the project or company. Both types of offsets can be deployed together. Offsets are commonly determined by land area, based on the assessment of residual impacts on the total area of identified biodiversity values, following the application of Steps 1–3. Offsets are often complex and expensive, so attention to earlier steps in the mitigation hierarchy is preferable and much more cost effective.	For A&F sectors, both restoration and protection offsets could apply. Restoration of degraded habitats for productive purposes may not count as a restoration offset, but restoration of riparian habitat for instance could, if such habitat is part of the identified biodiversity values (and therefore feature in the NPI goals). Conservation set–asides on A&F land could count as a protection offset, again provided they are conserving the identified biodiversity values and therefore feature in the NPI goals. In all cases, the 4 core offset principles would have to apply: limits to offsets; comparable compensation; additional to what would have happened without the interventions; and permanent. Pilgrim et al. (2013) have devised a generic burden–of–proof framework that can be used as a starting point to assess the appropriateness and effectiveness of offsets in the A&F context. Edwards and Laurance (2012) have proposed 'biobanks' as an offset mechanism to protect priority biodiversity values in tropical agricultural landscapes. They suggest a biodiversity banking framework that would permit the clearance of smaller patches of forest, which are then offset within a large forest preserve protecting priority biodiversity features. If biobanks are independently secured and managed they suggest they could represent an important way of guaranteeing that land is protected (or spared) outside of the agricultural matrix, but at the expense of producers. See Van Teeffelen et al. (2014) for a discussion on the ecological, economic and institutional requirements for establishing such a framework.
Step 5: Additional conservation actions	**Objective**: to consider engaging in actions that can have positive, but difficult to quantify, effects on biodiversity in the project region. Such qualitative outcomes do not fit easily into the mitigation hierarchy, but may provide crucial support to the success of mitigation actions.	Such additional conservation actions would not be specific to the A&F sectors. They could include: engaging in activities to improve compliance with biodiversity related policies in the concerned landscapes and more broadly to increase conservation awareness with policy makers and local communities; permitting research on threatened species and/or habitats on company managed properties to better understand how to reverse their declines; or capacity building for local stakeholders to engage with implementation of compensation mechanisms such as offsets.

the scenario with degraded area to be broadly applicable to a range of situations involving land degradation, but to be operational additional factors must be considered, particularly if local communities are using these areas. [xix]

The following are the three illustrated scenarios (presented in the next few pages) that reflect considerations in both commercial agriculture and forestry contexts when applying an NPI approach:

SCENARIO 1: Existing agriculture (agroforestry, cropping) or forestry (natural forest, plantations) operations in managed landscapes with a majority of modified habitat.

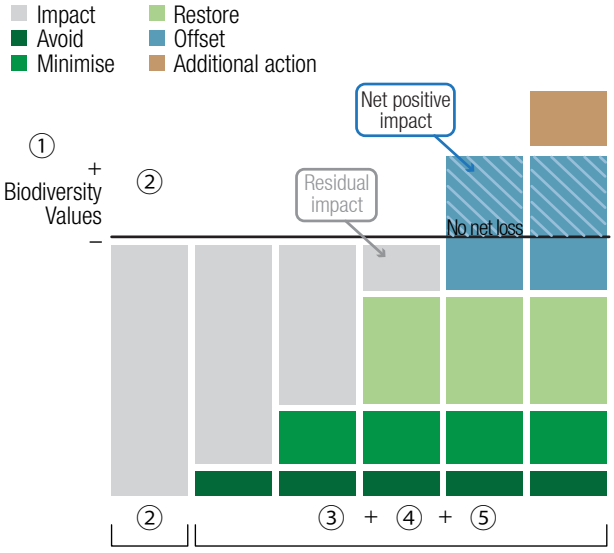
SCENARIO 2: Expanding agriculture (agroforestry, cropping) or forestry (natural forest, plantations) operations in legally authorised areas with a majority of natural habitat.

SCENARIO 3: Using ecologically degraded areas for agriculture (agroforestry, cropping) or forestry (natural forest, plantations) operations.

xix The most useful framework for considering the risks and opportunities from the use of degraded areas in this context is that of ecosystem services considered at a broad landscape level (IUCN 2014), which would include taking into account existing community uses. An example of a low risk area with high restoration potential would be one that is not delivering significant ecosystem goods (e.g. agricultural or forest products) or services (e.g. water provisioning, carbon sequestration, soil retention) of any kind to any stakeholder group. Ecosystem services are not considered in detail in this report, but see IUCN's report "Biofuels and degraded land: the potential role of intensive agriculture in landscape restoration." (McCormick et al. 2014) and the Bonn Challenge initiative (www.bonnchallenge.org) for more detailed considerations of degraded land issues that are beyond the scope of this report.

SCENARIO 1: Existing commercial agriculture (agroforestry, cropping) or forestry (natural

Mitigation Hierarchy



STAGE ①: Identify priority biodiversity values in the project region and define NPI goals (see schematic 1)

1a. Map all priority biodiversity values identified in the region and within operations: HCV / rare / natural habitat areas (e.g. old growth or natural forest), riparian areas, presence of 1 nationally threatened species (V1); beyond operations – HCV/rare habitat areas, legally protected area, nationally threatened species (E1, V1-2)

1b. Select the priority biodiversity features that the project can meaningfully influence and define NPI goals: goal 1 - NPI for all the HCV or rare habitat areas and riparian areas within project operational area, and beyond where feasible; goal 2 - 1 vulnerable species ('V1') within and beyond project areas.

STAGE ②: Map locations, compile trends, and establish a baseline or reference frame of the selected biodiversity features

2a – Map spatial data on biodiversity features of the NPI goals

2b – Compile information on trends of these biodiversity features: declining area of rare habitat and riparian areas, and declining populations of V1.

2c – Establish an objective baseline point in time of the condition of biodiversity features, such as: condition with full legal compliance and without project interventions occurring; or pre-certification condition of biodiversity features (if certification is being used); and assess unmitigated project impacts against this.

STAGE ③: Overlay ongoing or expected project intervention plans to mapped biodiversity data and apply the mitigation hierarchy.

Step 1 - **Avoidance actions**: Opportunities for avoidance are limited as operations already exist in the landscape, but some area-based and impact-based avoidance actions are still possible: Area-based – HCV/rare habitat and riparian areas are set-aside; Impact-based – some hazardous agrochemicals are avoided (agriculture, plantations), no removal of deadwood that support vulnerable species (forestry) in area of operations.

Step 2 - **Minimisation actions**: Opportunities for minimising impacts are greater than in the avoidance stage as operations are ongoing. Area-based actions – fragmentation and disturbance of priority biodiversity areas & vulnerable species habitat are minimised with buffer zones (reduced disturbance activities such as agroforestry or selective logging) & corridors; Practice-based actions in area of operations – impacts minimised with integrated pest management, limits on agrochemical application and/or improved crop productivity (agriculture, plantations), adoption of SFM approaches (forestry).

Step 3- **Restoration actions**: Likely more opportunities for restoration in a modified landscape - introduction of native species that will benefit priority biodiversity features through agroforestry systems (agriculture, plantations), replanting of tree species (for forestry and agroforestry systems in particular but also applicable to agriculture), restoration of riparian habitats and corridors if degraded or absent, and increased landscape heterogeneity overall.

Step 4 – **Offset actions**:

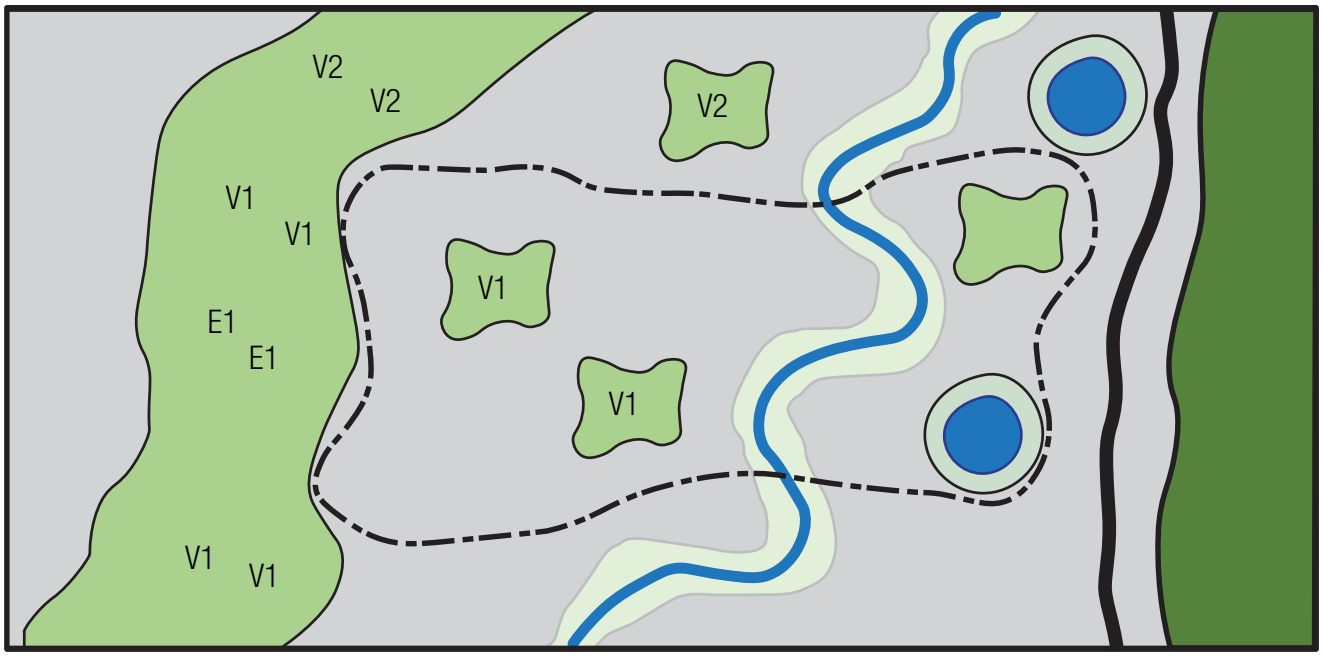
4.1: **Assess residual impacts**: Based on the assessment of the unmitigated biodiversity impacts (step 2c), and the gains from avoidance, minimisation and restoration stages (step 3), the residual impact is assessed: loss of one natural habitat area within site, impacts from some hazardous agrochemicals still being used, some areas are without buffer zones or adequate corridors, some areas are without native species restoration, and increased threats of expansion impacts on remaining natural habitats (in situations where agricultural productivity is increasing substantially). For illustrative purposes, the residual impact is depicted to occupy the grey shaded area (cumulative impact of all remaining impacts following avoidance, minimisation and restoration measures).

4.2: **Assess possible conservation gains of priority biodiversity features and implement compensation actions**: The landscape is then assessed for suitable areas to compensate for the residual impacts at a greater than equivalent level to achieve the NPI goal. Compensation action through the form of an averted loss offset is implemented in the adjacent patch of HCV/rare habitat area that is not a legally protected area and where several threatened species (including V1) are present. A conservation easement is applied to the green shaded area, in order to achieve NPI of the selected priority biodiversity features in the project region.

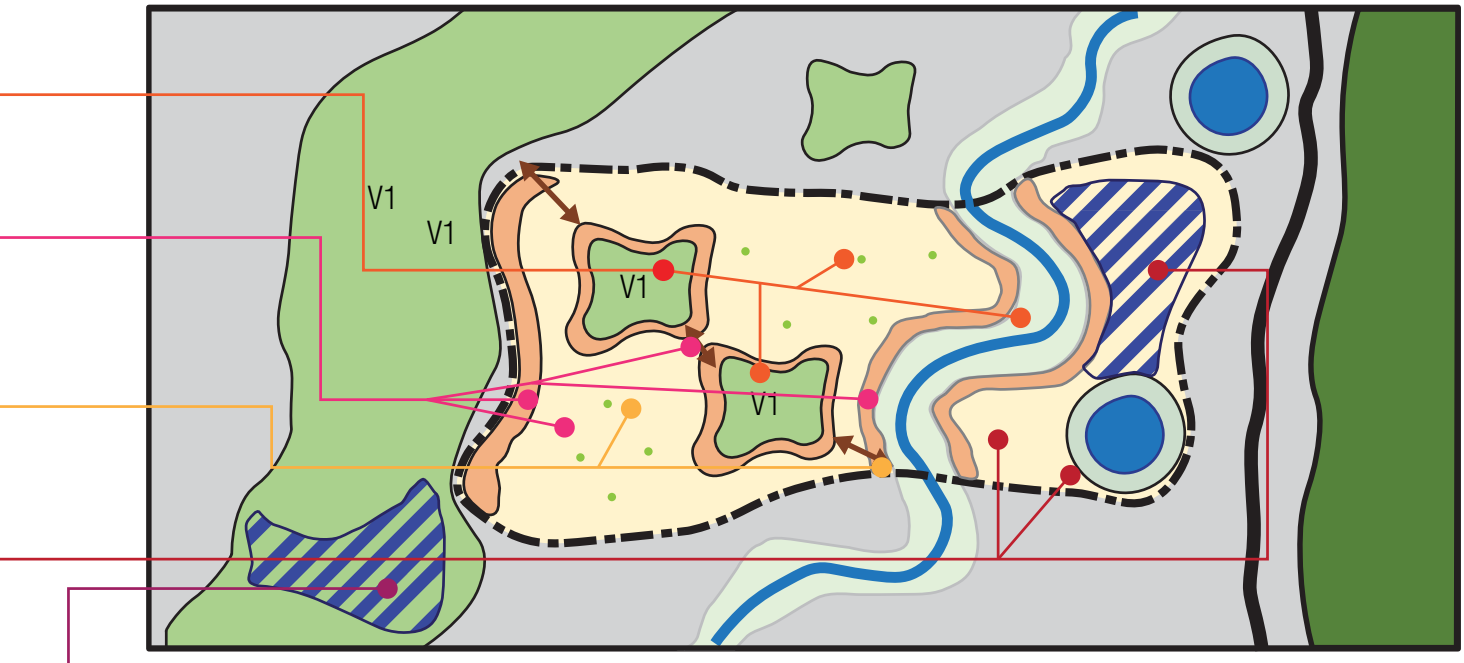
STAGES ④ and ⑤: Implement the resulting project plan from stage 3 and a monitoring plan to assess progress towards the NPI goal.

forest, plantations) operations in managed landscapes with a majority of modified habitat

Schematic 1



Schematic 2

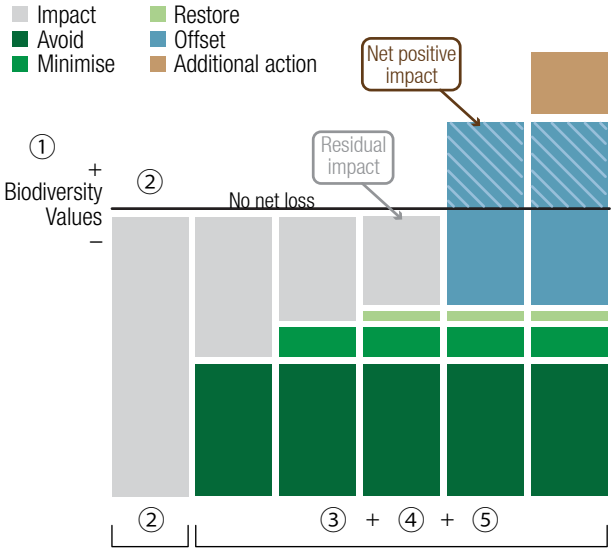


Legend

- Water bodies (stream, river, lake, wetland)
- Riparian areas (natural habitat around water bodies)
- HCV or rare habitat or natural habitat areas
- Legally protected area
- E/V Record of presence of Endangered (E) or Vulnerable (V) species
- Offset area
- Area under agricultural and forest management
- Area under proposed or ongoing management interventions
- Buffer areas with reduced disturbance activities
- Project boundary
- Road
- Native species retention or restoration
- Wildlife corridor

SCENARIO 2: Expanding agriculture (agroforestry, cropping) and forestry (natural forest,

Mitigation Hierarchy



STAGE ①: Identify priority biodiversity values in the project region and define NPI goals (see schematic 1)

1a - Priority biodiversity values identified in the region: within concession – HCV/ rare habitat area (if an HCV assessment has not been done), riparian area, presence of 2 nationally threatened species (V1-2), secondary natural habitat; beyond operations – HCV/ rare habitat areas, legally protected area, secondary natural habitat, presence of nationally threatened species (E1-3, V1-3).

1b - Select the priority biodiversity features that the company can meaningfully influence and define NPI goals: goal 1 – NPI for HCV or rare habitat areas, riparian areas, secondary habitat area within project operational area, and beyond where feasible; goal 2 – NPI for 2 threatened species (V1, V2).

STAGE ②: Map locations, compile trends, and establish a baseline or reference frame of the selected biodiversity features

2a - Map spatial data on biodiversity features of the NPI goals

2b - Compile information on trends of these biodiversity features: declining area of rare and secondary habitat, riparian areas, and declining populations of V1, V2.

2c – Establish an objective baseline point in time of the condition of biodiversity features, such as: condition with full legal compliance and prior to project interventions occurring; or pre-certification condition of biodiversity features (if certification is being used); and assess unmitigated project impacts against this.

STAGE ③: Overlay ongoing or expected project intervention plans to mapped biodiversity data and apply the mitigation hierarchy.

Step 1 - Avoidance actions: In a new concession, opportunities for avoidance on priority biodiversity features are greatest as no habitat conversion or modification has taken place as yet: Area-based – HCV/rare habitats and riparian areas are set-aside; Impact-based – some hazardous agrochemicals are avoided (agriculture, plantations), no removal of deadwood that support vulnerable species (forestry) in area of operations, avoided conversion of secondary habitat to maintain corridors, stepping stones and landscape heterogeneity.

Step 2 - Minimisation actions: Opportunities for minimising impacts are less than in the avoidance stage as any operations in a new concession will have a negative impact, but magnitude of negative impacts is reduced through: Area-based actions – fragmentation and disturbance of priority biodiversity areas and the vulnerable species habitat are minimised with retention of corridors, minimise total area of operations to reduce offset requirements; Practice-based actions in area of operations – impacts minimised with integrated pest management, limits on agrochemical application and/or improved crop productivity (agriculture, plantations),minimise clearing of native vegetation,adoption of selective logging or SFM approaches (forestry).

Step 3 - Restoration actions: In a new concession without degradation, opportunities for restoration are smallest compared to the avoidance and minimisation stages - replanting of tree species and cleared secondary habitat (for SFM forestry and agroforestry systems in particular) is one option.

Step 4 – Offset actions:

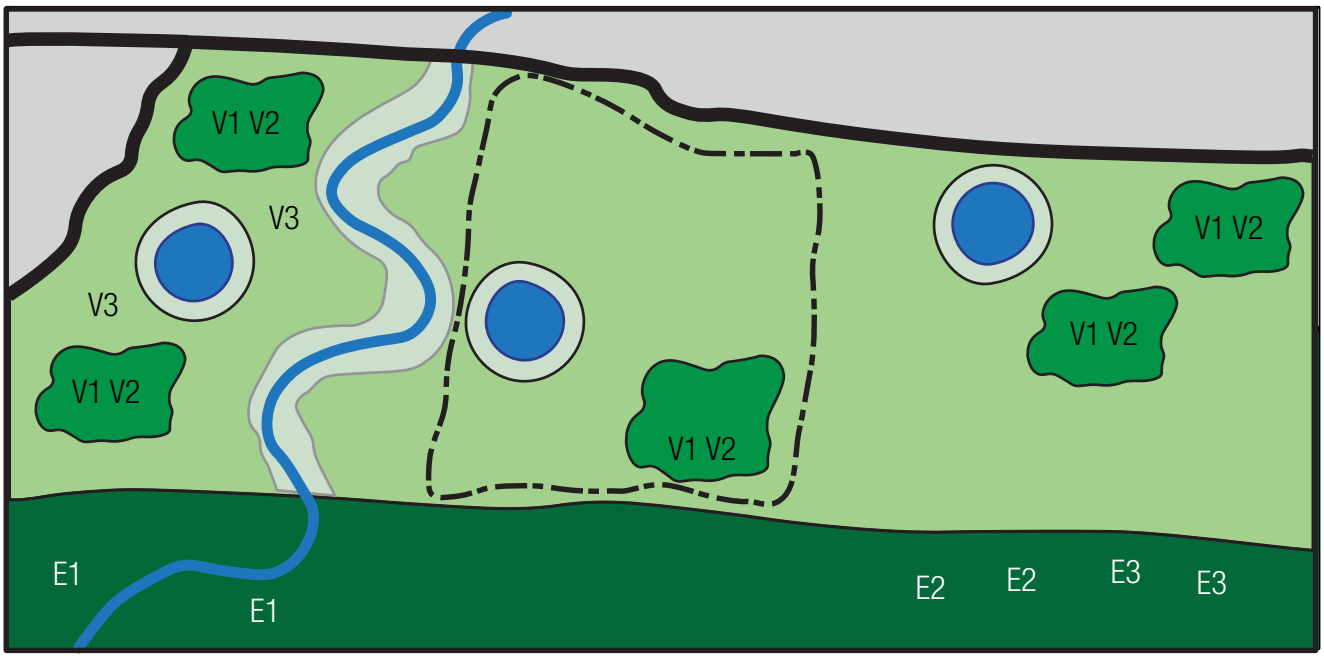
4.1: Assess residual impacts: Based on the assessment of the unmitigated biodiversity impacts (step 2c), and the gains from avoidance, minimisation and restoration stages (step 3), the residual impact is assessed: residual loss of secondary habitat area, impacts from some hazardous agrochemicals still being used, and increased threats of expansion impacts on remaining natural habitats (in situations where agricultural productivity is increasing). For illustrative purposes, the residual impact is assessed to be the cumulative area of all converted secondary habitat – this is the extreme case for agriculture and plantations as the conversion is complete and permanent, but would be less compensation area for forestry (due to cyclical harvesting of SFM approaches that aims to maintain biodiversity, productivity and regeneration capacity) and agroforestry (due to native species retention).

4.2: Assess possible conservation gains of priority biodiversity features and implement compensation actions: The landscape is then assessed for suitable areas to compensate for the residual impacts at a greater than equivalent level to achieve the NPI goal. Compensation action through the form of an averted loss offset is implemented in the adjacent patch of secondary habitats that is not a legally protected area. A conservation easement is applied to the outlined shaded area (with area adjusted based on production system being SFM forestry or agroforestry (less compensation area required) or plantations or agriculture (more compensation area required), in order to achieve the NPI goal.

STAGES ④ and ⑤: Implement the resulting project plan from stage 3 and a monitoring plan to assess progress towards the NPI goal.

plantations) operations in legally authorised areas with a majority of natural habitat

Schematic 1



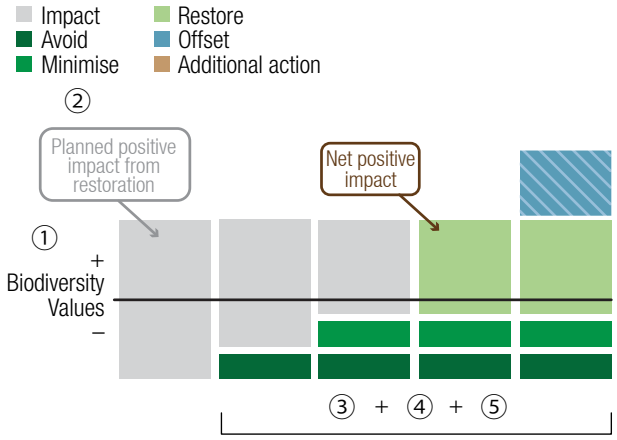
Schematic 2

Legend

- Water bodies (stream, river, lake, wetland)
- Riparian areas (natural habitat around water bodies)
- Secondary natural habitat
- HCV or rare habitat areas
- Legally protected area
- E/V Record of presence of Endangered (E) or Vulnerable (V) species
- Area under agricultural and forest management
- Area under proposed or ongoing management interventions
- Project boundary
- Road
- Native species retention or restoration

SCENARIO 3: Using ecologically degraded areas for agriculture (agroforestry, cropping)

Mitigation Hierarchy



STAGE ①: Identify priority biodiversity values in the project region and define NPI goals (see schematic 1)

1a - Priority biodiversity values identified in the region: within concession – secondary habitat area, riparian area, presence of 1 nationally threatened species (V1); beyond operations – secondary habitat areas, legally protected area, presence of nationally threatened species (E1, V2).

1b – Select the priority biodiversity features that the company can meaningfully influence and define NPI goals: goal 1 – NPI for secondary habitat area and riparian areas within concession; goal 2 – NPI for 1 threatened species (V1)

STAGE ②: Map locations, compile trends, and establish a baseline or reference frame of the selected biodiversity features

2a - Map spatial data on biodiversity features of the NPI goals

2b - Compile information on trends of these biodiversity features: declining secondary habitat and riparian areas, and declining populations of V1.

2c – Establish an objective baseline point in time of the condition of biodiversity features, such as: condition with full legal compliance and without project interventions occurring; and assess unmitigated project impacts against this. Due to planned restoration of riparian habitats, the project has both positive and negative impacts from the outset (as reflected in the bar graph on the left).

STAGE ③: Overlay ongoing or expected project intervention plans to mapped biodiversity data and apply the mitigation hierarchy.

Step 1 - Avoidance actions: In a degraded area there will likely be some natural habitat remaining and these are all priority areas for avoidance. Area-based – all secondary habitat and riparian areas are set-aside; Impact-based – some hazardous agrochemicals are avoided (agriculture, plantations).

Step 2 - Minimisation actions: As the area is degraded, there is limited productive activity occurring but new production systems are designed to minimise impacts on natural areas (as they become restored). Area-based actions – plan to improve connectivity (so as to minimise fragmentation of restored areas) from the outset through buffer zones and stepping stones; Practice-based actions in area of operations – impacts minimised with integrated pest management, limits on agrochemical application and/or improved crop productivity (agriculture, plantations), adoption of SFM approaches (forestry).

Step 3 - Restoration actions: Opportunities for restoration are the greatest compared to the avoidance and minimisation stages: placement of production areas in the most degraded portions of the landscape (such that no additional loss of natural habitats occurs); restoration of all degraded riparian areas in the concession; restoration of native species where feasible (particularly for agriculture, agroforestry and plantation systems, as native species would most likely be used for SFM approaches).

Step 4 – Offset actions:

4.1: Assess residual impacts: In principle there should be no residual impacts provided ALL mitigation measures plan to be implemented. Additional natural habitats (i.e. riparian areas in this scenario) are being created and native species are being introduced (e.g. agroforestry systems with native species) through restoration and this will deliver positive impact for the selected priority biodiversity features. Due to the increased productivity of the degraded areas in the region there could be greater pressure to convert natural habitats beyond the project concession, so efforts can be taken to safeguard these areas.

4.2: Assess possible conservation gains of priority biodiversity features and implement compensation actions: In principle if all mitigation measures plan to be implemented, compensation action off-site is not required as positive impacts for priority biodiversity features are generated on-site through restoration actions - serving as restoration offsets on-site. Additional conservation actions should still be encouraged, particularly to protect natural habitat areas that may be under pressure of conversion as productivity is increased in the region – e.g. capacity-building in the nearby protected area and/or with local land use planners for improved planning and management effectiveness of conservation values in the project region.

STAGES ④ and ⑤: Implement the resulting project plan from stage 3 and a monitoring plan to assess progress towards the NPI goal.

Schematic 1

Schematic 2

Legend

- Water bodies (stream, river, lake, wetland)
- Riparian areas (natural habitat around water bodies)
- Secondary habitat areas
- Legally protected area
- E/V Record of presence of Endangered (E) or Vulnerable (V) species
- Ecologically degraded areas
- Area under agricultural and forest management
- Area under proposed or ongoing management interventions
- Buffer areas with reduced disturbance activities
- Riparian restoration areas
- Project boundary
- Road
- Native species retention or restoration

3.3 Discussion: an NPI approach appears plausible for the A&F sectors under some conditions

The scenario exercise demonstrates that an NPI approach based on the five main stages appears plausible in some commonly expected situations in the A&F sectors, theoretically and under some conditions. The illustrations detail the general steps that would be expected to implement the five stage process, but do not provide a detailed roadmap for real world situations. The intent is that the scenario exercises can be used as initial guidance for piloting an NPI approach in the A&F sectors in the real world. Piloting this approach is essential for understanding actual feasibility on the ground (including economic feasibility). Two critical aspects of an NPI approach that are not discussed in much detail in the scenario exercise, but are important to consider in more detail in the real world, are establishing baselines and offset actions.

Establishing an objective baseline or reference frame for the original condition of the selected priority biodiversity values prior to project interventions is an important part of an NPI approach. The project's progress towards achieving its NPI goals is evaluated against this reference frame. Two options exist for evaluating the outcomes of NPI goals: reference frames can be fixed baselines (i.e. known condition of biodiversity features at a fixed point in time) or counterfactuals (i.e. a scenario that would have occurred without the project interventions. A useful reference frame must include at least two facets of environmental change in the project region: ongoing trends in biodiversity and anthropogenic impacts upon biodiversity; and, in general, where biodiversity loss is occurring, NPI is most feasible when a counterfactual is used as a reference frame[32].

In the scenarios, two counterfactual reference frames are presented in simple terms: full legal compliance prior to project interventions occurring (i.e. the counterfactual is a development situation with full legal compliance only – which would be one likely business–as–usual scenario); or pre–certification conditions if certification is being used (i.e. the counterfactual is a development situation where conventional production takes place instead of certified production). These are indicative and there will be other options depending on the real world situation. Some key questions to answer when establishing the reference frame include: 1) Is biodiversity loss occurring in the landscape of the project due to anthropogenic impacts? If so, which impacts are responsible? 2) Is biodiversity loss expected to continue in the concerned landscape without the project interventions? And if so, how? A more detailed consideration of baselines is beyond the scope of this report and is an area that would benefit from piloting an NPI approach in real world situations.

With regards to offset actions in the scenarios, area–based offsets are used to illustrate the concept of compensation in an A&F context because they are the most common form of offsets used currently. However, as currently conceived area–based offsets may not be appropriate when there is large–scale clearing of natural habitat for agriculture[33], given the scale of compensation that would be required. While offsets are commonly determined by land area, compensation mechanisms need not necessarily be restricted to this. For example, resources allocated to identify and resolve underlying causes of biodiversity loss in a region, to strengthen or safeguard protected areas, or to establish corridors or buffer zones to enhance existing conservation areas can also be considered valid forms of ecological compensation[34]. Such options would be particularly relevant in the A&F context as the scenarios show – further investigation is needed on this in the future.

Based on the workshop discussions and subsequent scenario exercise, the working group identified two main conditions (not mutually exclusive) that would be favourable for NPI approaches in the A&F sectors:

1. Enhancing native biodiversity, and/or protecting species or areas of conservation concern:
    - » Where A&F production systems are designed to host more native wildlife and to reduce impacts on native wildlife. For e.g., hosting more wildlife through native habitat retention and/or restoration, and reducing impacts through

measures such as creation of wildlife corridors and buffer zones, control of invasive species impacts, and reduction of pollution.

» Where species or areas of conservation concern are identified within the project site and are protected against negative impacts from productive activities. For e.g., the identification of globally threatened species or ecosystems or HCV areas and their protection through species–specific measures or avoidance of conversion.

2. Diversifying A&F production species on–site, and/or, improving productivity and natural resource use efficiency on–site along with promotion of safeguards to protect natural habitats off–site against conversion:

» Where crop and timber species are diversified through the introduction of new crops, agroforestry, or timber species on site. Increasing the diversity of A&F production species can benefit biodiversity by increasing landscape heterogeneity[xx] and thereby making the production areas (also referred to as the 'matrix' around natural areas) more structurally similar to areas of natural habitat in the landscape. The value of a structurally complex matrix as potential habitat for wildlife has been demonstrated for a range of organisms in landscapes throughout the world, including agricultural and forestry landscapes in Central America, Australia, Europe and North America[35].

» Where the productivity of A&F production systems are increased through yield gains and improved use of natural resources (e.g. water, soil, energy) and accompanied with safeguards to protect against conversion of existing natural areas including beyond project boundaries. In areas where productivity gains are made, particularly in agricultural systems, there is often more pressure for conversion of remaining natural habitats in the landscape[36]. Productivity gains therefore must be accompanied by the promotion of strong safeguards against the conversion of natural areas in the landscape to achieve an NPI goal. Where natural areas do not exist in large proportions, some restoration of natural habitat would be required. For example, situations of agricultural systems with below average yields and where there is potential to safeguard remaining natural habitats in the landscape; or agricultural systems in ecologically degraded areas where there is potential to improve yields and restore natural habitats.

By highlighting favourable conditions for NPI approaches in A&F sectors, it is then also possible to indicate conditions that would not be favourable, on the basis that the risk of biodiversity losses would outweigh any opportunity for additional conservation gains:

1. Where the development project will cause large–scale impacts on ecosystems and/or species in natural areas where regional biodiversity loss is not occurring. In a regional context where biodiversity loss is not occurring (i.e. biodiversity trends are stable or increasing over time), avoiding development activities would be better for biodiversity than NPI approaches for development activities[37]. The exception to this condition could be for large landscapes in a regional context where biodiversity loss is occurring (e.g. high deforestation rates at a regional or national level) due to pressures from anthropogenic impacts – in such situations there could be potential for NPI approaches, provided conservation gains from project interventions can directly contribute to addressing regional biodiversity loss rates.
2. Where there is a risk that the protection measures and safeguards for natural habitat areas and/or species and areas of conservation concern in and around the production site will be poorly designed or will not be enforced effectively. For example, in situations with poor governance or inadequate enforcement mechanisms, there could be a risk of natural habitats being converted and the conservation gains being no longer valid. However,

xx Heterogeneity is the spatial patchiness and variability in landscape patterns and it can occur at multiple spatial scales (Benton et al. 2003). Where landscapes are used for the production of agricultural or forestry commodities, there is widespread evidence that heterogeneous landscapes, which resemble natural patterns, provide greater biodiversity benefits than intensively managed monocultures (Fischer et al. 2006).

with a strong monitoring programme in place (as required by Stage 5 of the five stage process), such risks could be proactively addressed.

3. Where the identification of relevant biodiversity values to establish NPI goals has not been derived from existing societal biodiversity conservation goals in policies or plans (e.g. national biodiversity policies, strategies, action plans, international policy), and not taken account of local and other relevant stakeholder input (including farmers, foresters, and resident communities as applicable). NPI goals that do not integrate these aspects will not ensure that biodiversity conservation, local stakeholders, and resident communities benefit from implementing the NPI approach.

3.4 Conclusion: summary of conditions when an NPI approach is plausible in the A&F sectors, and the multiple benefits an NPI approach could bring to A&F production and sourcing systems

In sum, an NPI approach could be plausible for A&F sectors under two main conditions:

1. Enhancing native biodiversity, and/or protecting species or areas of conservation concern.
2. Diversifying agricultural and forestry production species on–site, and/or, improving productivity and natural resource use efficiency on–site along with promotion of safeguards to protect natural habitats off–site against conversion.

And, an NPI approach would not be plausible for A&F sectors under three conditions: where the project will cause large–scale impacts on ecosystems and/or species, where biodiversity protection measures are poorly designed or will not be enforced effectively, and/or where societal biodiversity concerns and local and other relevant stakeholder input has not been taken account of in the NPI goals.

The three scenarios illustrating the implementation of the proposed five–step process for an NPI approach for A&F sectors are hypothetical, but offer some key insights for implementation in real world situations:

- Operating or sourcing A&F products from areas of high biodiversity value or ecologically degraded areas: the NPI approach proposed here is likely best suited for project regions where there is a known occurrence of priority biodiversity values for global to local conservation that will be impacted by large A&F actors operating or sourcing within a spatially delimited area. And, that there are known options for successful mitigation of those impacts for implementation directly by, or indirectly through the sourcing influence of, these large A&F actors. This NPI approach could also be deployed in ecologically degraded areas where there is potential for ecological restoration.
- Companies can build on existing sustainability efforts: the NPI approach proposed here can build on existing company efforts that may contain some of the key components and some elements of the five–step process. This could include relevant regulatory compliance procedures pertaining to biodiversity impact mitigation (e.g. A&F sector policies related to biodiversity, Environmental Impact Assessments), company environmental management systems, company biodiversity strategies or commitments, and A&F sustainability standards being implemented or committed to by the company (or by its suppliers).
- Claims: this report did not discuss the issue of making NPI claims once NPI goals are achieved – this must be better understood once an NPI approach is piloted. Rather than making product–level claims, it is more likely that a company could claim that certain parts of its agricultural and/or forestry operations or supply chains (e.g. where it is operating or sourcing from regions of priority biodiversity values) are contributing to No Net Loss or Net Positive Impacts of those values with quantified

evidence (if a product is being completely sourced from a landscape implementing an NPI approach then a product–level claim could be considered).

This report has highlighted some key benefits that an NPI approach could bring to development projects in the A&F sectors:

- Defines time–bound quantifiable conservation goals evaluated against a reference frame
- Applies all steps of the mitigation hierarchy from a landscape perspective
- Addresses some gaps in current A&F sustainability standards related to achieving defined conservation impact
- Enables the potential for improving the overall resilience of commercial agricultural and forestry production and sourcing systems.
- Provides an innovative approach for high impact business sectors to further contribute to addressing the global biodiversity crisis.

3.5 Next steps

In closing, this report is only the beginning of an innovative exploration. Going forward, there is still much to do with exploring the application of an NPI approach in A&F sectors.

The main recommendation of the working group for an important next step is:

- Pilot this NPI approach in suitable A&F situations. To date, the working group is not aware of projects that have piloted NPI approaches in A&F landscapes[xxi]. By piloting the NPI approach proposed here, its feasibility can be assessed in more detail, and practical information regarding some critical aspects in the A&F context can be gained, including:
  - » Establishing appropriate reference frames for evaluation of progress towards NPI goals.
  - » A better understanding of the boundaries between the steps of the mitigation hierarchy, including what A&F measures will count as meeting the objectives of the avoidance, minimise, restoration and compensation steps.
  - » A broader consideration of appropriate compensation options including area–based offsets, resources allocated to addressing drivers of biodiversity loss, and strengthening of protected area management in the landscape or region.
  - » A better understanding of the types of NPI claims that can be made once NPI goals are achieved.

To encourage A&F companies and other relevant organisations to consider piloting the NPI approach proposed here, the working group conducted an initial assessment of A&F situations that could have high, medium, or low potential for NPI, based on this report's key findings (see Annex 3). This initial assessment is theoretical, but is based on the experience of the working group in A&F and E&I sectors. The working group looks forward to seeing pilot projects in the near future, and to the wider uptake of Net Positive Impact approaches in the A&F sectors that responsibly balance biodiversity protection with existing and future development needs.

xxi This report's focus is primarily on landscape–based approaches at realizing NNL/NPI goals. Towards the completion of this report, the working group was made aware of a relevant pilot project in supply chains. For companies or organisations interested in a detailed analysis and a piloted approach of realizing NNL/NPI goals across their entire supply chains, see 'Compensating Biodiversity Loss: Dutch companies experience with biodiversity compensation including their supply chains – the BioCom Project' (de Bie, S., van Schaick, 2011) which looked at three companies in the food services, timber trade, and energy sectors.

Glossary

Landscapes	A landscape is a mosaic of interdependent and different types of land use such as agriculture, forests, agroforestry systems, pasture (or other economic or subsistence land uses), riparian strips along waterways, ecological corridors, and conservation areas. Managed as a whole, a landscape serves a variety of needs for various stakeholders. The IUCN vision of a landscape is of multiple and complementary land uses based on negotiation rather than centralized planning. Landscapes do not exist in a vacuum, but are influenced by a wide range of external factors including policies and economic conditions generated far outside it, land use in adjacent landscapes and perhaps remote physical features such as dams. (Adapted from Machado and Gordon 2012; and, IUCN and WRI, 2014)
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. (FAO 2015)
Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed. (FAO 2015)
Planted forest (referred to as plantations in this report)	Forest predominantly composed of trees established through planting and/or deliberate seeding. (FAO 2015)
Reforestation	Re-establishment of forest through planting and/or deliberate seeding on land classified as forest. (FAO 2015)
Afforestation	Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest. (FAO 2015)
Deforestation	The conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold. (FAO 2015)
Net deforestation or net change in forest area	The difference in forested area between two points in time, taking into account both losses from deforestation and gains from forest regeneration and/or tree plantations, divided by the number of years between the two time periods. (Brown & Zarin 2013)
Gross deforestation	Clearing of primary forests (Brown & Zarin 2013)
Sustainable forest management	The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems. (FAO 2010)

References

Athanas, A. 2005. The role of business in biodiversity and impact assessment. Impact Assessment and Project Appraisal: 23.

Bai Z.G., Dent D.L, Olsson L and Schaepman ME. 2008. Global assessment of land degradation and improvement. 1. Identification by remote sensing. Report 2008/01, ISRIC – World Soil Information, Wageningen.

Benton, T. G., J. A. Vickery, and J. D. Wilson. 2003. Farmland biodiversity: is habitat heterogeneity the key? Trends in Ecology & Evolution : 18.

Blackman, A. and Rivera, J. 2010. The Evidence Base for Environmental and Socioeconomic Impacts of "Sustainable" Certification. Resources for the Future, Washington DC.

Brown, E., N. Dudley, A. Lindhe, D.R. Muhtaman, C. Stewart, and T. Synnott (eds.). 2013. Common guidance for the identification of High Conservation Values. HCV Resource Network, Oxford.

Brown, E. and M.J.M. Senior. 2014. Common guidance for the management and monitoring of High Conservation Values. HCV Resource Network, Oxford.

Brown, S., and Zarin, D. 2013. What does zero deforestation mean? Science: 342.

Bull J. W., Suttle B. K., Gordon A., Singh N. J. and Milner-Gulland E.J. 2013. Biodiversity offsets in theory and practice. Oryx: 47.

Bull, J.W, Gordon A., Law, E.A., Suttle, K.B., Milner-Gulland, E.J. 2014. Importance of baseline specification in evaluating conservation interventions and achieving no net loss of biodiversity. Conservation Biology: 28(3).

Business and Biodiversity Offsets Programme (BBOP). More information: http://bbop.forest-trends.org/pages/biodiversity_offsets

BBOP Pilot Projects. 2009-2014. Available here: http://bbop.forest-trends.org/pages/pilot_projects

BBOP, United Nations Environment Programme (UNEP) Finance Initiative, and PricewaterhouseCoopers (PWC). 2010. Biodiversity offsets and the mitigation hierarchy: a review of current application in the banking sector. PWC, London.

BBOP. 2012. Resource Paper: No Net Loss and Loss–Gain Calculations in Biodiversity Offsets. Business and Biodiversity Offsets Programme, Washington, DC, USA.

Chappell, M., Vandermeer, J., Badgley, C., Perfecto, I., 2009. Wildlife-friendly farming vs. land sparing. Frontiers in Ecology and the Environment: 7.

Clough Y., Barkmann J., Juhrbandt J., Kessler M., Wanger T., Anshary A., Buchori D., Cicuzza D., Darras K., Putra D., Erasmi S., Pitopang R., Schmidt C., Schulze C., Seidel D., Steffan-Dewenter I., Stenchly K., Vidal S., Weist M., Wielgoss A., et al. 2011. Combining high biodiversity with high yields in tropical agroforests. Proceedings of the National Academy of Sciences: 108.

Consumer Goods Forum (CGF) Sustainability Information: http://www.theconsumergoodsforum.com/sustainability.aspx

Convention on Biological Diversity BD Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets. Available at: http://www.cbd.int/sp/

COSA. 2013. The COSA Measuring Sustainability Report: Coffee and Cocoa in 12 Countries. Philadelphia, PA: The Committee on Sustainability Assessment (COSA).

de Bie, S., van Schaick J., 2011. Compensating biodiversity loss: Dutch companies' experience with biodiversity compensation, including their supply chain. The 'BioCom' Project. De Gemeynt, Klarenbeek. Pb2011-001. Available for download here: http://www.gemeynt.nl/nl/downloads

Edwards, D., and S. Laurance. 2012. Green labelling, sustainability and the expansion of tropical agriculture: Critical issues for certification schemes. Biological Conservation 151: 6064.

Edwards, D., B. Fisher, and D. Wilcove. 2012. High Conservation Value or high confusion value? Sustainable agriculture and biodiversity conservation in the tropics. Conservation Letters: 5.

Edwards, D.P., Fisher, B. and Wilcove, D.S. 2011. Green labelling being misused. Nature: 475

Edwards, D., J. Hodgson, K. Hamer, S. Mitchell, A. Ahmad, S. Cornell, and D. Wilcove. 2010. Wildlife friendly oil palm plantations fail to protect biodiversity effectively. Conservation Letters: 3.

Equator Principles. 2013. Equator Principles III: A financial industry benchmark for determining, assessing and managing environmental and social risk in projects. More information: http://www.equator-principles.com/

European Union 2020 Biodiversity Strategy, Action 7 under Target 2, more information: http://ec.europa.eu/environment/nature/biodiversity/nnl/index_en.htm

Fischer J., Brosi B., Daily G., Ehrlich P., Goldman R., Goldstein J., Lindenmayer D., Manning A., Mooney H., Pejchar L., Ranganathan J. and Tallis H. 2008. Should agricultural policies encourage land sparing or wildlife-friendly farming? Frontiers in Ecology and the Environment: 6.

Fischer, J., Lindenmayer D.B., and Manning A.D. 2006. Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes. Frontiers in Ecology and the Environment: 4.

Food and Agriculture Organization of the UN (FAO). 2015. FRA 2015 Terms and Definitions. Forest Resources Assessment (FRA) Working Paper 180. Rome.

Food and Agriculture Organization of the UN (FAO). 2010. Global Forest Resources Assessment 2010. FAO Forestry Paper 163. Rome.

Gardner, T.A., Von Hase, A., Brownlie, S., Ekstrom, J.M.M., Pilgrim, J.D., Savy, C.E., Stephens, R. T. T., Treweek, J., Ussher, G. T., Ward, G. and Ten Kate, K. 2013. Biodiversity Offsets and the Challenge of Achieving No Net Loss. Conservation Biology, 27: 1254–1264.

Global Road Map - A strategic approach for zoning and planning roads: http://www.global-roadmap.org/publications/

Globalbalance and The Biodiversity Consultancy. 2014. Review of the International Council on Mining and Metals members' biodiversity performance management since 2003. Unpublished report to ICMM & IUCN.

Green, R. E., S. J. Cornell, J. P. Scharlemann, and A. Balmford. 2005. Farming and the fate of wild nature. Science: 307.

Gullison, R.E. 2003. Does forest certification conserve biodiversity? Oryx: 37.

High Conservation Value Resource Network (HCVRN): https://www.hcvnetwork.org/

International Council on Mining & Metals (ICMM). 2010. Mining and Biodiversity: A Collection of Case Studies. ICMM, London, UK.

International Finance Corporation (IFC). 2012. Performance Standard 6 (PS6). Biodiversity

Conservation and Sustainable Management of Natural Resources. Washington, DC, USA.

International Union for Conservation of Nature (IUCN) and International Council on Mining & Metals (ICMM). 2013. Independent report on biodiversity offsets. Prepared by The Biodiversity Consultancy. Available at: www.icmm.com/biodiversity-offsets

IUCN and WRI (2014). A guide to the Restoration Opportunities Assessment Methodology (ROAM): Assessing forest landscape restoration opportunities at the national or sub-national level. Working Paper (Road-test edition). IUCN: Gland, Switzerland.

IUCN Red List of Threatened Species. http://www.iucnredlist.org/

Kiesecker, J., H. Copeland, A. Pocewicz, and B. McKenney. 2010. Development by design: blending landscape-level planning with the mitigation hierarchy. Frontiers in Ecology and the Environment: 8.

Koh L., Levang P. and Ghazoul J. 2009. Designer landscapes for sustainable biofuels. Trends in ecology & evolution: 24.

Machado F., and Gordon, J. 2012. Extracting Value from the Forest: Lessons learned in the Acre landscape, Brazil. IUCN: Gland, Switzerland.

Madsen, B., Carroll, N. and Moore Brands, K. 2010. State of Biodiversity Markets Report: Offset and Compensation Programs Worldwide. Available at: http://www.ecosystemmarketplace.com/documents/acrobat/sbdmr.pdf

Martin, T.G., Nally, S., Burbridge, A.A., Arnall, S., Garnett, S.T., Hayward, M. W., Lumsden, L. F., Menkhorst, P., McDonald-Madden, E. and Possingham, H. P. 2012. Acting fast helps avoid extinction. Conservation Letters: 5.

McCormick, N., Jenkins, M. and Maginnis, S. 2014. Biofuels and degraded land: the potential role of intensive agriculture in landscape restoration. Gland, Switzerland: IUCN.

McKenney, B. A., and J. M. Kiesecker. 2010. Policy development for biodiversity offsets: a review of offset frameworks. Environmental Management 45:165–176

Milder, J., Arbuthnot, M., Blackman, A., Brooks, S., Giovannucci, D., Gross, L., Kennedy, E., Komives, K., Lambin, E., Lee, A., Meyer, D., Newton, P., Phalan, B., Schroth, G., Semroc, B., Rikxoort, H., Zrust, M., 2015. An agenda for assessing and improving conservation impacts of sustainability standards in tropical agriculture. Conservation Biology: 29.

Milder, J.C., Gross, L.H., and Class, A.M. 2012. Assessing the ecological impacts of agricultural eco- certification and standards: A global review of the science and practice. Internal report: EcoAgriculture Partners. Washington, DC.

Minnemeyer, S., Laestadius, L., Sizer, N., Saint-Laurent, C. and Potapov, P. 2011. A World of Opportunity. The Global Partnership on Forest Landscape Restoration, World Resources Institute, South Dakota State University and IUCN.

Pilgrim, J. D. & Ekstrom, J. M. M. 2014. Technical conditions for positive outcomes from biodiversity offsets. An input paper for the IUCN Technical Study Group on Biodiversity Offsets. IUCN, Gland, Switzerland.

Pilgrim, J. D., S. Brownlie, J. M. Ekstrom, T. A. Gardner, A. Hase, K. Kate, C. E. Savy, RT Stephens, H. J. Temple, and J. Treweek. 2013. A process for assessing the offsetability of biodiversity impacts. Conservation Letters: 6.

Potts, J., M. Lynch, A. Wilkings, G. Huppé, M. Cunningham, and V. Voora. 2014. The State of Sustainability Initiatives Review 2014: Standards and the Green Economy. International Institute for Sustainable Development (IISD), Winnipeg; and the International Institute for Environment and Development (IIED), London.

Quétier, F., and S. Lavorel. 2011. Assessing ecological equivalence in biodiversity offset schemes: Key issues and solutions. Biological Conservation: 144.

Quetier, F., Regnery, B., and Levrel, H. 2014. No net loss of biodiversity or paper offsets? A critical review of the French no net loss policy. Environmental Science & Policy: 38.

Quintero, J.D., and Mathur, A. 2011. Biodiversity offsets and infrastructure. Conservation Biology: 25.

Rainey, H., Pollard, E., Dutson, G., Ekstrom, J., Livingstone, S., Temple, H., Pilgrim, J., 2014. A review of corporate goals of No Net Loss and Net Positive Impact on biodiversity. Oryx: 17.

Rio Tinto Sustainable Development Strategy 2012. Available at: http://www.riotinto.com/sustainabledevelopment2012/environment/biodiversity.html

Robinson, J.G. 1993. The limits to caring: sustainable living and the loss of biodiversity. Conservation Biology: 7.

Robinson, J.G. 2012. Common and conflicting interests in the engagements between conservation organizations and corporations. Conservation Biology: 26.

Romero, C., Putz, FE., Guariguata, MR., Sills, EO., Cerutti, PO. and Lescuyer, G. 2013. An overview of current knowledge about the impacts of forest management certification: A proposed framework for its evaluation. Occasional Paper 91. CIFOR, Bogor, Indonesia.

Sayer J., Sunderland T., Ghazoul J., Pfund J.-L., Sheil D., Meijaard E., Venter M., Boedhihartono A., Day M., Garcia C., Oosten C. and Buck L. 2013. Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. Proceedings of the National Academy of Sciences: 110.

Secretariat of the Convention on Biological Diversity (SCBD) and United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC). 2012. Best policy guidance for the integration of biodiversity and ecosystem services in standards. Technical Series No. 73. SCBD, Montreal.

Senior, M., E. Brown, P. Villalpando, and J. Hill. 2014. Increasing the Scientific Evidence Base in the “High Conservation Value” (HCV) Approach for Biodiversity Conservation in Managed Tropical Landscapes. Conservation Letters: doi: 10.1111/conl.12148

Steering Committee of the State-of-Knowledge Assessment of Standards and Certification (SCSASC). 2012. Toward sustainability: The roles and limitations of certification. RESOLVE Inc.: Washington, DC.

Teeffelen, A., P. Opdam, F. Wätzold, F. Hartig, K. Johst, M. Drechsler, C. Vos, S. Wissel, and F. Quétier. 2014. Ecological and economic conditions and associated institutional challenges for conservation banking in dynamic landscapes.

Landscape and Urban Planning 130: 6472.

Temple, H.J., Anstee, S., Ekstrom, J., Pilgrim, J.D., Rabenantoandro, J., Ramanamanjato, J.-B., Randriatafika, F. & Vincelette, M. (2012). Forecasting the path towards a Net Positive Impact on biodiversity for Rio Tinto QMM. IUCN: Gland, Switzerland.

ten Kate, K. and Crowe, M.L.A. 2014. Biodiversity Offsets: Policy options for governments. An input paper for the IUCN Technical Study Group on Biodiversity Offsets. IUCN: Gland, Switzerland.

The Biodiversity Consultancy (TBC). 2015. Mitigation Hierarchy. Available here: http://www.thebiodiversityconsultancy.com/mitigation-hierarchy/

The Bonn Challenge. Global Partnership on Forest and Landscape Restoration. More information: www.bonnchallenge.org

The Economics of Ecosystems and Biodiversity (TEEB). 2010. The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB.

Tropical Forest Alliance. More information: http://www.tfa2020.com/

Tscharntke, T., J. Milder, G. Schroth, Y. Clough, F. DeClerck, A. Waldron, R. Rice, and J. Ghazoul. 2015. Conserving Biodiversity Through Certification of Tropical Agroforestry Crops at Local and Landscape Scales. Conservation Letters: 8.

UN Convention to Combat Desertification (UNCCD) Article 1: use of terms. http://www.unccd.int/

UN Global Compact (UNGC) and IUCN. 2012. A Framework for Corporate Action on Biodiversity and Ecosystem Services. Available at: http://www.unglobalcompact.org/docs/issues_doc/Environment/BES_Framework.pdf

UNEP-WCMC. 2011. Review of the Biodiversity Requirements of Standards and Certification Schemes: A snapshot of current practices. Technical Series No. 63. SCBD, Montreal.

van Kujik M., Putz FE, Zagt R. 2009. Effects of forest certification on biodiversity. Tropenbos International, Wageningen, Netherlands.

World Business Council for Sustainable Development's (WBCSD) Action 2020. More information: http://action2020.org/

World Economic Forum (WEF). 2010. Biodiversity and business risk: A global risks network briefing. Prepared for WEF by PriceWaterhouseCoopers.

Yaap, B., Struebig M.J., Paoli G., and Koh L.P. 2010. Mitigating the biodiversity impacts of oil palm development. CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources: 5.

Annex 1: Mining NNL/NPI example

Summary of an NPI approach for a mining site

Rio Tinto QIT Madagascar Minerals (QMM) pilot site for NPI

The mine site

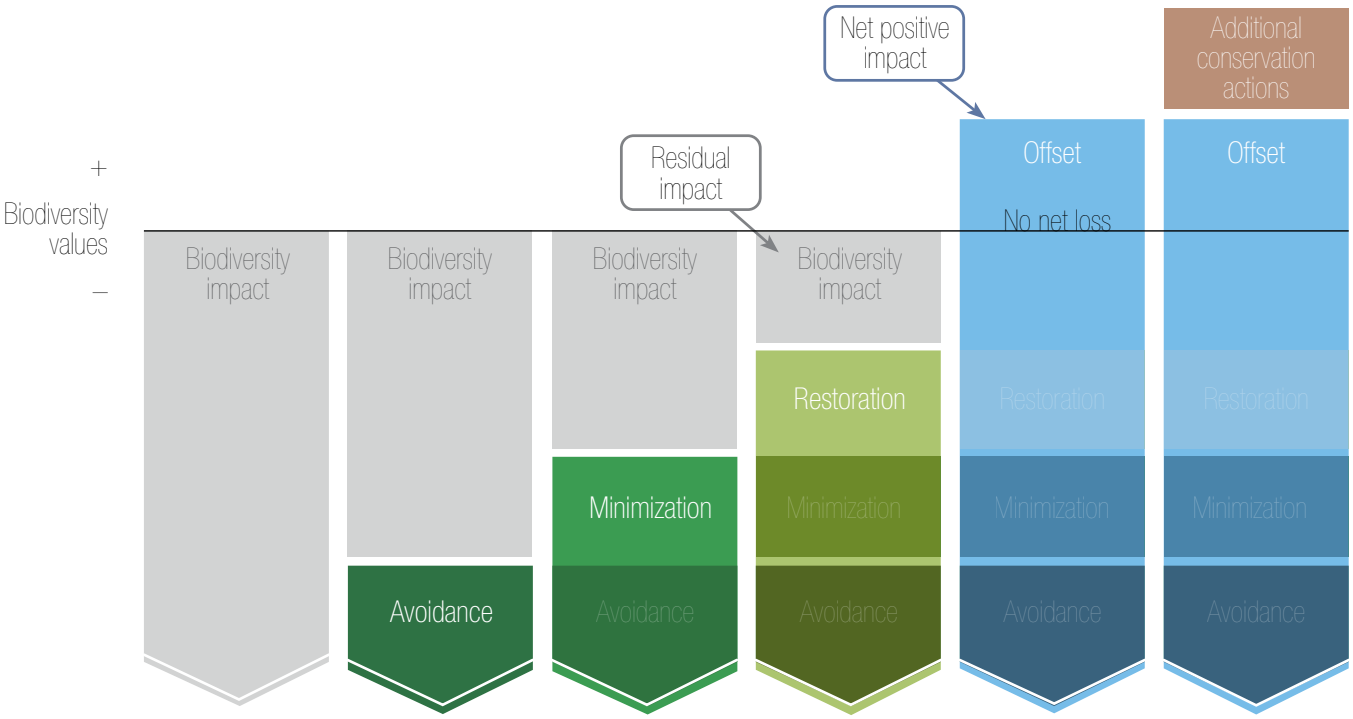
The largest development project in Madagascar, Rio Tinto QMM's operations comprise three sites to be mined sequentially (Mandena, Ste Luce, and Petriky) as well as a new deepwater port and ancillary infrastructures such as roads, quarry, housing and industrial areas. Mining at the first site, Mandena, commenced in 2009. The mining lease is located in the Anosy region of south eastern Madagascar, one of the country's most ecologically diverse areas. In particular, the lease includes a significant part of the country's remaining littoral forest. Only around 10% of the original extent of Madagascan littoral forest remains in small fragments, with only 1.5% included within the existing protected areas network. In 2005, the mining zone accounted for 6.5% (3,128 ha) of the country's total remaining area of littoral forest (47,900 ha), although significant deforestation has occurred since then. Littoral forest is particularly high in plant diversity. Despite originally occupying less than 1% of the island's land surface, 13% of Madagascar's total native flora has been recorded from this habitat type. Littoral forests on the mining lease harbour many restricted–range species and species evaluated as threatened on the IUCN Red List.

Mitigation Activities

Rio Tinto QMM is undertaking the following current and proposed activities to mitigate the mine's impacts on key habitats and species and achieve a Net Positive Impact on biodiversity, presented graphically against the mitigation hierarchy

Rio Tinto QMM is also carrying out Additional Conservation Actions to help reduce human pressure on biodiversity and make a positive contribution to sustainable development. These include scientific research, environmental education for children, building capacity in government environmental entities, and developing livelihood alternatives by training local people in a variety of skills.

Text in Box 1 excerpted from: "*Forecasting the path towards a net positive impact on biodiversity for Rio Tinto QMM*" Temple H et al. (2012), IUCN and Rio Tinto Publication. Available here: http://www.iucn.org/knowledge/publications_doc/publications/?uPubsID=4711



MINE IMPACTS

The most important direct negative impact of mining activities on biodiversity will be loss of 1,665 ha of littoral forest (3.5% of the remaining 47,900 ha) through dredging, which involves clearing vegetation and removing soil. Habitat loss will be incremental over the next 40–50 years as the mine dredge moves slowly through the landscape, with approximately 50 ha being actively mined at any one time.

AVOID

Establishing and managing Avoidance Zones: Collectively covering an area of 624 ha, these areas are now legally recognized protected areas and protect 27% of the best quality remaining forest cover on the ilmenite deposit. The establishment of these protected areas within the mining zone cost Rio Tinto QMM 8% of foregone resource.

MINIMISE

Minimising unavoidable impacts:

A diverse range of activities have been implemented to reduce the likelihood or magnitude of biodiversity impacts from mining activities.

RESTORE

Rehabilitation and restoration: Littoral forest will be re-established in areas that have been cleared, by replacing topsoil stored during the mining process and planting with native species. A planned area of 225 ha will be restored at each site, located adjacent to the Avoidance Zones to provide a buffer, improve connectivity and facilitate natural regeneration and recolonization.

OFFSET

Biodiversity offsets: Rio Tinto QMM is investing in biodiversity offsets at several forest sites in the region, with the aim of reducing high background rates of deforestation. These offset sites cover c. 6000 ha of forest. The offset plans include a much larger area than is actually "needed" to achieve Net Positive Impact, thus creating a buffer against future unknown risks such as climate change and political instability.

Annex 2: Infrastructure NNL/NPI Example

Summary of an NNL approach focussing on a priority species in an infrastructure project

The Nimes – Montpellier rail–link in Southern France

A recently permitted 80km rail link between Nimes and Montpellier, known as Contournement ferroviaire Nîmes – Montpellier (henceforth, CNM), provides an interesting and recent example of residual impacts on biodiversity of an infrastructure project being managed through offsets. The public rail company Réseau Ferré de France (RFF) led the initial phases of the project and conducted the Environmental Impact Assessment (EIA), including its biodiversity components.

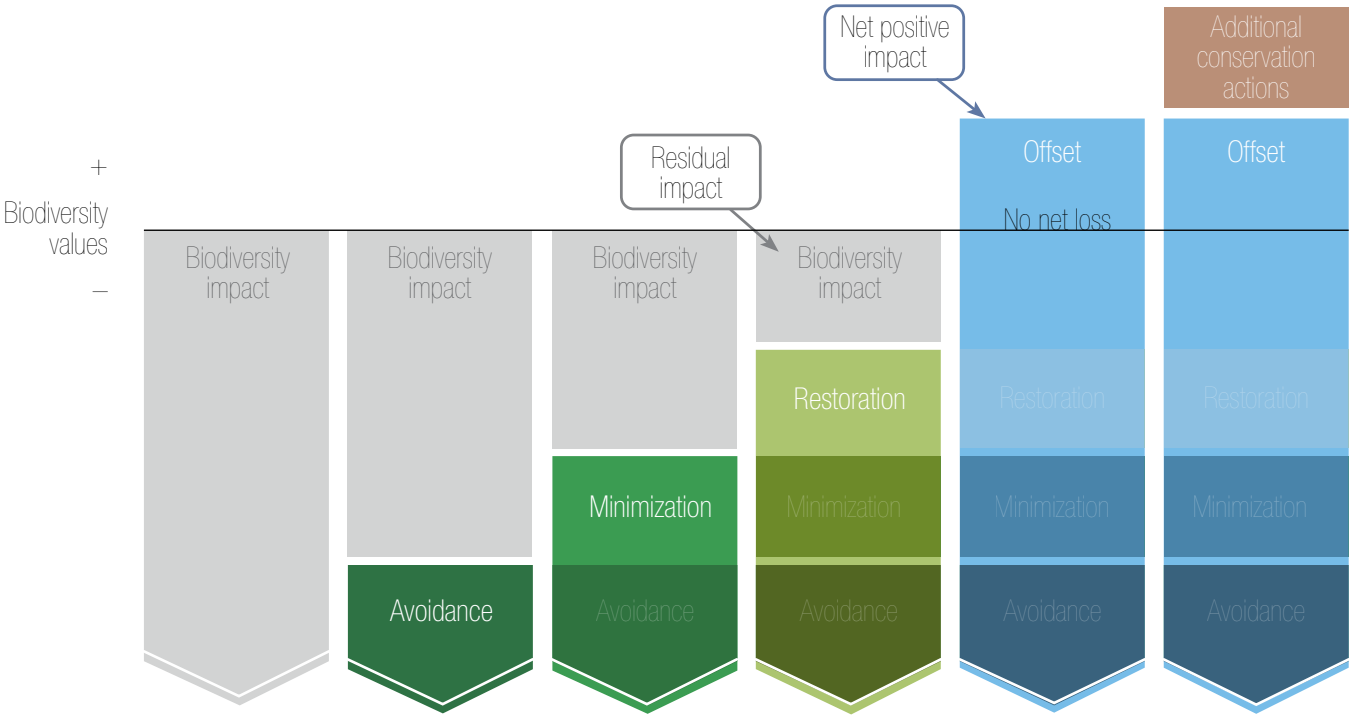
Although the project is being built in mostly modified habitats, which are or have been cultivated and where human population densities are high and increasing, a number of biodiversity features raised concern in terms of the project's impacts. A particular concern are species typically associated with extensive low–productivity) agricultural systems that have suffered strong declines in Western Europe due to a combination of agricultural intensification on the one hand, and spontaneous afforestation following abandonment on the other. The local population of the Little Bustard (Tetrax tetrax[xxii]) was a key concern. This bird is Near Threatened (NT) at the global level, but is a nationally protected species in France (under Ministerial Order of April 17th 1981), where it benefits from a national action plan for its conservation, and it is listed in Annex I of the European 'Birds' Directive which led to the designation of Special Protection Areas (SPA) for its conservation. These include the Natura 2000 site "Costières Nîmoises" which the CNM crosses, which would therefore qualify as critical habitat for the species, in the French and European context.

Mitigation measures, aimed at avoiding, reducing and offsetting impacts were planned at the EIA stage and RFF had committed to purchasing 500ha and restoring them as favourable habitat for the Little Bustard before leasing the land to farmers required to manage them favourably, and signing similar contracts over 640ha with farmers willing to engage in favourable management on their own land.

CNM is a public–private partnership and a call for tender was set up to identify a suitable company to finance and execute the building of the line and to run it for 25 years. Following the concession agreement (signed in January 2012) RFF's commitments concerning offsets were transferred to Oc'via Construction, a project–company. In addition to the initial EIA, Oc'via Construction had to seek consent for the works under a number of sectoral policies, including those related to wetlands and protected species. Concerning the latter, with 126 protected species impacted, a set of avoidance, reduction and offset measures were designed. A number of avoidance and reduction measures were taken, such as displacing the line's trajectory to avoid impacting a site of the endangered plant species Lythrum Thesioides). Offsets were required to achieve the no net loss objective set by national guidelines published in 2012 (Quétier et al. 2014).

Biotope, a French consultancy specialised in biodiversity and ecosystem services assessment and management, developed a methodological framework for demonstrating ecological equivalence between the residual impacts ("losses") and the offset measures ("gains"), for each impacted species for which derogation was sought (following Quétier & Lavorel, 2011). Losses and gains were expressed as quality–hectares, with habitat quality for the Little Bustard supported by over 10 years of field survey data, and parallel investigations on habitat use by the Little Bustard through radio–tracking. Overall, 337 ha of Little Bustard habitat lost to the footprint of the project were counted as 456 quality–hectares. An additional 1886 ha were degraded by indirect disturbance and counted as 2239 quality hectares. Offsets therefore aimed to generate an increase of at least 2695 quality–hectares just for this species. ⇨

xxii The Little Bustard is a nationally protected species in France (under Ministerial Order of April 17th 1981), and benefits from a National Action Plan. The species is listed in Annex I of the 'Birds' Directive 79/409/CEE which led to the designation of Special Protection Areas (SPA), including the Costières Nîmoises affectées affected by CNM.



MINE IMPACTS

The most important directive negative impact of the building and operation of the railway line will be the loss of 700 ha of various natural and modified habitat types. A number of these are protected per-se, such as wetlands, or because they have been found to harbour protected species of fauna and flora (over 600 ha). The project's footprint is considered as a permanent loss of habitat. Another key impact is disturbance, beyond the footprint, during construction and during operation (from the passage of high speed trains). These impacts were taken into account using buffer areas where habitat quality is degraded (with degradation higher closest to the line).

AVOID

The design of the railway line took into consideration existing protected areas and areas of known scientific interest. However, due to the delay between establishing the preferred route and the actual construction, a number of impacts could not be avoided. Only minor adjustments could be made such as redesigning some sections to avoid populations of endangered plants discovered during baseline surveys.

MINIMISE

A diverse range of activities have been implemented to reduce the likelihood or magnitude of biodiversity impacts from construction (timing of works, elimination of favourable habitat outside the breeding season to decrease mortality) and operations (underpasses to maintain wildlife connectivity, especially along all permanent and temporary waterways).

RESTORE

Impacts on the footprint were considered permanent, including areas cleared and disturbed as part of construction. Although the construction sites will be restored to either natural or modified habitats (e. g farming) as appropriate, this wasn't computed into the loss-gain calculations.

OFFSET

Oc'Via is investing in biodiversity offsets at several sites in the region, with the aim of enhancing the quality of habitat for target species. In particular, this involves incentivising land-owners and managers (farmers) to shift their land-use practices to benefit species associated with extensive agricultural landscapes. Farmers are compensated by Oc'Via for the extra management cost and/or opportunity costs. The company's commitment extends for the full duration of the concession (25 years).

⇨ The Little Bustard was not the only impacted species, and in fact, the overall tally of CNM reaches 3,279 quality–hectares lost, of which 95 per cent are open farmland habitat. It has been estimated that generating this amount of offset would require between 1,700 and 2,100 hectares, on which enhancements would have to be maintained for at least 25 years (until the rail line is handed back to RFF). RFF began implementing offsets in 2008, and over 950 quality hectares had been secured before works began. Further implementation of the offset plan is on–going.

Annex 3: Initial NPI Potential of Forestry and Agriculture Development Scenarios

Initial NPI Potential of Forestry Development Scenarios

Landscape type	Proposed or ongoing project intervention	Proposed or ongoing production system	Expected key characteristics of the proposed or ongoing intervention and production system	Overall NPI potential and main reason
Existing managed land with a majority of modified habitat	Improving biodiversity compatibility of forestry operations.	Sustainable Forest Management[xxiii]* (SFM) of natural forest, including selective logging (with verified evidence for sustainable practices)	Transitioning forestry with unsustainable practices to verified SFM could result in potential biodiversity benefits from: responsible chemical use (if applicable); set–asides of HCV / rare habitat areas; set–asides and/or restoration of corridors, buffer zones, species–specific benefits.	High – retention of natural forest in the landscape at sustainable levels will support wildlife
		Sustainable management of plantations** (with verified evidence for sustainable practices)	Transitioning conventional plantations with unsustainable practices to verified sustainable plantations could result in potential biodiversity benefits from: responsible chemical use (if applicable), conservation set–asides (e.g. HCV areas); set–asides and/or restoration of corridors, buffer zones, and species–specific benefits.	High to medium – depends on extent of degradation from unsustainable practices prior to project intervention
New legally authorised concessions in areas with a majority of natural habitat	Expanding forestry operations into new areas of natural habitat.	Selective logging in natural forests	Degradation of natural forests would need to be offset, but would be less costly than offsetting a clear–cut or establishment of a plantation on natural forest areas.	Medium – intact natural areas are still being disturbed
		SFM in new areas of natural forests (with verified evidence for sustainable practices)	Forest loss and degradation happens in portions across the landscape in a cycle that maintains some of the forested area, making offsets potentially feasible and not necessarily cost prohibitive.	Medium – intact natural areas are still being fragmented
		Sustainable plantations in new areas of natural habitat (with verified evidence for sustainable practices)	Clearing of natural area for forest plantation establishment would result in significant decline in biodiversity and acreage under plantation management. Offsets could be cost prohibitive due to scale at which the impact occurs.	Low – loss of large areas of natural habitat that will need to be fully compensated for
Landscapes with ecologically degraded areas	Using ecologically degraded areas for forestry operations.	SFM or sustainable plantations in ecologically degraded areas (with verified evidence for sustainable practices)	Identifying lands with potential for restoration and improving the provision of ecosystem goods (forestry products) and services (e.g. water provisioning, carbon sequestration, soil retention) while protecting and restoring natural habitat – offsets may not be needed in such situations.	High – restoration of natural habitats (that were previously degraded) through forestry operations

xxiii SFM is defined as (FAO 2011): The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems. **Sustainable plantation management based on SFM principles.

Initial NPI Potential of Agriculture Development Scenarios

Landscape category	Proposed or ongoing project intervention	Proposed or ongoing production system	Expected key characteristics of the proposed or ongoing intervention and production system	Overall NNL/NPI potential and main reason
Existing managed land with a majority of modified habitat	Enhancing native biodiversity, and/or protecting species or areas of conservation concern.	Agroforestry and/ or native species restoration	Introducing or expanding agroforestry practices using native tree species and/or native species restoration on existing cultivated lands, particularly those that are largely monoculture systems.	High – native species and habitat restoration
		native species and habitat restoration	Transitioning conventional plantations with unsustainable practices to verified sustainable plantations could result in potential biodiversity benefits from: responsible chemical use (if applicable), conservation set–asides (e.g. HCV areas); set–asides and/or restoration of corridors, buffer zones, and species–specific benefits.	High to medium – depends on extent of degradation from unsustainable practices prior to project intervention
	Increasing crop diversity and/or productivity and accompanied with safeguards to protect against conversion of existing natural areas including beyond project boundaries	Conventional agricultural system with improving crop diversity and/or productivity	Transitioning lower yielding cultivated land that is driving expansion into natural habitats to improve crop diversity and/or productivity while also putting into place conservation of, or improved management of, natural habitats to ensure expansion does not continue.	Medium – depends on effectiveness of crop diversification to benefit biodiversity and prevention measures to avoid expansion into natural areas
New legally authorised concessions in areas with a majority of natural habitat	Expanding agricultural operations into new areas of natural habitats.	Agroforestry and/ or sustainable agricultural management (with verified evidence for sustainable practices)	Conversion of natural areas to agroforestry and/ or sustainable agricultural management results in significant loss of priority biodiversity features and would need to be offset in equal areas. Agroforestry systems will retain some priority biodiversity features (e.g. native tree species from converted natural habitats) but the natural area will still be significantly degraded. Due to scale of area to be offset, costs would be substantial.	Low – loss of large areas of natural habitat that will need to be fully compensated for

Landscape category	Proposed or ongoing project intervention	Proposed or ongoing production system	Expected key characteristics of the proposed or ongoing intervention and production system	Overall NNL/NPI potential and main reason
Landscapes with ecologically degraded areas	Using ecologically degraded areas for agricultural operations.	Agroforestry and/or native species restoration in degraded areas (with ongoing agricultural activities or no use)	Identifying lands with potential for restoration and improving the provision of ecosystem goods (agricultural products) and services (e.g. water provisioning, carbon sequestration, soil retention) while protecting and restoring natural habitat – offsets may not be needed in such situations. Examples of measures include: introducing or expanding agroforestry practices using native tree species and/or native species restoration on existing degraded areas with unproductive agricultural activities ongoing or no use at all. Level of biodiversity benefits would depend on extent of degradation prior to project intervention and landscape context (e.g. conversion of degraded pasture to silvo-pastoral system with native tree species could have high potential).	High to medium – native species restoration occurs but full potential would depend on extent of degradation prior to project intervention and extent of cover restored within the degraded areas.
		Sustainable agricultural management (with verified evidence for sustainable practices) in degraded areas	Introduction of sustainable agricultural management in degraded areas could result in potential biodiversity benefits from: responsible chemical use, conservation set-asides (e.g. riparian habitat), restoration of corridors and buffer zones, and species-specific benefits. Level of biodiversity benefits would depend on extent of degradation prior to project intervention, type of cropping system (e.g. monoculture or polyculture), and landscape context.	Medium – potential would depend on extent of conservation set-asides, restoration areas, type of cropping system, and extent of degradation prior to project intervention.
		Conventional agricultural system in degraded areas with improving crop diversity and/or productivity	Improving crop diversity and/or productivity of conventional agricultural systems in degraded areas to more diverse and higher yielding productive areas could decrease continued expansion and/or degradation of natural areas in the region as long as safeguards against such conversion are put in place and enforced. Where natural areas may not exist in the region, some restoration measures must occur (e.g. restoration of riparian areas).	Medium – potential would depend on effectiveness of crop diversification to benefit biodiversity and prevention measures to avoid expansion into natural areas (and if natural areas do not exist, potential would then depend on extent of natural habitat restored)

Endnotes

1. Gardner et al. 2013
2. Gardner et al. 2013
3. IUCN ICMM 2013
4. Image adapted from: UN Global Compact and IUCN 2012 Publication: A Framework for Corporate Action on Biodiversity and Ecosystem Services (pg 14). http://www.unglobalcompact.org/docs/issues_doc/Environment/BES_Framework.pdf
5. Rainey et al. 2014
6. CBD Strategic Plan for Biodiversity 2011–2020, including Aichi Biodiversity available at: http://www.cbd.int/sp/
7. Action 7 under Target 2, more information: http://ec.europa.eu/environment/nature/biodiversity/nnl/index_en.htm
8. McKenney & Kiesecker 2010
9. Rainey et al. 2014
10. IFC 2012 PS6
11. http://www.equator–principles.com/
12. Rainey et al. 2014
13. CBD Strategic Plan for Biodiversity : http://www.cbd.int/sp/
14. Kiesecker et al. 2009
15. Pilgrim and Ekstrom 2014
16. Gardner et al. 2013
17. http://www.riotinto.com/sustainabledevelopment2012/environment/biodiversity.html
18. Rainey et al. 2014
19. Rainey et al. 2014
20. SSI 2014
21. SSI 2014
22. UNEP WCMC 2011
23. Milder et al. 2015; Romero et al. 2013
24. HCV Resource Network: https://www.hcvnetwork.org/
25. Brown et al. 2013
26. Senior et al 2014
27. Edwards et al. 2011
28. Senior et al 2014
29. Text adapted from TBC's Mitigation Hierarchy description: http://www.thebiodiversityconsultancy.com/mitigation–hierarchy/
30. IFC 2012
31. Adapted from UNCCD 2013 and Bai et al. 2008
32. Bull et al. 2014
33. Gardner et al. 2013
34. Yaap et al. 2010
35. Fischer et al. 2008
36. Chappell et al. 2009
37. Bull et al. 2014

Notes

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INTERNATIONAL UNION
FOR CONSERVATION OF NATURE

WORLD HEADQUARTERS
Rue Mauverney 28
1196 Gland, Switzerland
mail@iucn.org
Tel +41 22 999 0000
Fax +41 22 999 0002
www.iucn.org