BACKGROUND PAPER

Applying the mitigation hierarchy in a complex world

Current approaches for mitigating and managing the impacts of development

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FAUNA & FLORA INTERNATIONAL

Report prepared by Fauna & Flora International

Fauna & Flora International (FFI) protects threatened species and ecosystems worldwide, choosing solutions that are sustainable, based on sound science and take account of human needs. Founded in 1903, FFI is the world's longest established international conservation body and a registered charity. For more information see: www.fauna-flora.org

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SUMMARY

This background paper is the second of two papers supporting the 'Collaborating Across the Landscape to Mitigate impacts of development - the CALM Framework' (FFI, 2021a). The first of the background papers (FFI, 2021b) provides an overview of projections for multisectoral development in Africa and related impacts on species, ecosystems and the benefits they provide to people. This second paper looks at some of the current approaches to prevent, mitigate and manage the adverse environmental impacts of development projects in the context of complex multi-use landscapes.

The paper provides an overview, based on a rapid review, of widely adopted approaches to, and drivers for, mitigating and managing the impacts of development at different scales – from global drivers and national regulatory processes for impact assessment, to voluntary standards and safeguards and company commitments. Their utility and application, and some of the strengths and weaknesses of the different approaches are discussed.

The paper then focuses on the mitigation hierarchy as a well-established framework designed to help users limit and mitigate negative environmental impacts. Challenges for the effective prevention, mitigation and management of adverse impacts through mitigation hierarchy application in complex multi-use landscapes are considered. This includes variable uptake and implementation within and among different sectors (and the alternative approaches that have been adopted to mitigate and manage impacts), failures to avoid impacts in the first place, and ineffective piecemeal mitigation efforts.

Each of approaches highlighted through the paper has merit, being designed to deliver its own scope, scale and objectives. However, biodiversity and ecosystem services are often inadequately incorporated, and the array of approaches available are not always complementary to one another and are usually applied in isolation. Collectively, existing approaches have largely failed to deliver an integrated approach to identifying and managing risks and impacts in complex landscapes.

The paper highlights the need for more integrated, coordinated and cross-sectoral planning and action at the landscape level, with solutions that bridge divides across sectors and scales, and that fully consider the cumulative effects of development and other pressures on complex socioecological systems.

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GLOBAL DRIVERS FOR SUSTAINABLE LANDSCAPES

Landscapes are multifunctional, with land and natural resources supporting diverse uses and valued in myriad ways by different land users. Yet growing demands – for energy, land, water, minerals and natural resources – are rapidly outpacing the capacity of landscapes to meet competing needs. This is creating conflict over land allocations and rights and resulting in rapid ecosystem degradation, poverty and food insecurity, water crises, and contributing to global climate change. See background report by FFI (2021b) for an overview of projections for multisectoral development in Africa and related impacts on species, ecosystems and the benefits they provide to people.

What is a landscape?

A landscape is a socioecological system comprising a mosaic of natural and/or human modified ecosystems, with a characteristic configuration of topography, vegetation, land use, and settlements that is influenced by the ecological, historical, economic and cultural processes and activities of the area. Spatial configuration of different land uses and cover types and the norms and modalities of its governance contribute to the character of a landscape

(Scherr et al., 2013).

Numerous sustainability goals seek to maintain these multiple values, with targets and timeframes set at global, regional, national and sub-national level. Reducing deforestation and forest degradation and increasing forest cover, mitigating climate change, halting biodiversity loss and combating land degradation are among the goals set through the ambitious agendas of the Paris climate agreement, the global Sustainable Development Goals (SDGs), the New York Declaration on Forests (NYDF), the Bonn Challenge, and the Convention on Biological Diversity (CBD) Aichi Biodiversity Targets (Box 1).

Global goals are driving regional targets such as the African Union's mandate, through the African Forest Landscape Restoration Initiative (AFR100) to bring 100 million hectares of degraded land into restoration by 2030. This contributes to the Bonn Challenge, the African Resilient Landscape Initiative (ARLI), the African Union Agenda 2063, the SDGs, and other targets and complements the regional plans and programmes such as the African Union's *African Landscapes Action Plan,* and the 'Climate Change, Biodiversity and Land Degradation (LDBA)' programme.

BOX 1: SELECT INTERNATIONAL SUSTAINABILITY GOALS AND INITIATIVES

The **Bonn Challenge**, launched in 2011, proposes to restore 350 million hectares of the world's deforested and degraded lands by 2030. It is an implementation vehicle for national priorities such as water and food security and rural development while contributing to the achievement of international climate change, biodiversity and land degradation commitments.

The 2014 **New York Declaration on Forests** issued a widely backed call to end natural forest loss by 2030.

SDG Goal 15 Life on Land: 'Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss'

The **Paris Agreement on climate change** strongly encourages parties to take action and support activities that reduce emissions from deforestation and forest degradation through results-based payments and other sustainable forest management approaches.

Tropical Forest Alliance, a global public-private partnership founded in 2012, encourages partners to reduce tropical deforestation in the sourcing of commodities such as palm oil, soy, beef, and pulp and paper.

UN-REDD Programme was launched in 2008 with the aim to reduce forest emissions and enhance carbon stocks in forests while advancing national sustainable development and mitigating climate change. The Programme supports nationally led Reducing Emissions from Deforestation and Forest Degradation (REDD+) processes and supports countries to develop their capacities to meet REDD+ related requirements of the United Nations Framework Convention on Climate Change.

Global and regional goals are also being translated into national targets and mainstreamed into policy and legislation to provide clearer, more enforceable, and measurable objectives for directing action on the ground. Under the Bonn Challenge, for example, Guinea and Liberia in West Africa have committed to bring 2 million and 1 million hectares, respectively, of degraded or deforested land under restoration. Over 120 countries (including 52 African countries), have also committed to setting Land Degradation Neutrality (LDN) (Box 2) targets; with over two thirds having already set targets, and many securing high-level government commitment to achieve LDN (United Nations Convention to Combat Desertification, 2020). Global and regional targets are also reflected in corporate commitments and sectoral standards ('Other drivers of better practice').

BOX 2: LAND DEGRADATION NEUTRALITY TARGET SETTING PROGRAMME

Global land degradation is a global concern with estimates reported to be somewhere between 25% and 30% of all land. Land degradation refers to the reduction or loss of the biological or economic productivity and complexity of land, reducing carbon storage in soil and vegetation, driving the loss of biodiversity, and accelerating climate change.

The Sustainable Development Goals include a target for LDN; a target adopted by the UNCCD in October 2015 where it is defined as a "state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems".

The LDN target complements and reinforces other existing goals including those of the UNFCCC, CBD, NYDF and Bonn Challenge. Countries committing to set LDN targets (national and sub-national) are required to define and map the extent and location of land degradation and develop strategies to ensure **neutral, or net positive, outcomes** through a combination of activities that actively **avoid, reduce and reverse land degradation** through restoration and sustainable land management interventions.

In the context of climate change and biodiversity loss, Guinea's national targets, for example, include restoring 375,000 hectares (or 55% of the total area of degraded ands) and limiting to 1% (238,440 hectares) the loss of non-degraded land relative to the 2000-2010 reference period with the aim of reaching land degradation neutrality (Global Mechanisms of UNCCD, 2018). This is complemented by an aim to increase by 1.5% (150,000 hectares) forest areas against the 2010 baseline and in line with the country's Intended Nationally Determined Contribution (INDC) under the Paris Agreement. Targets go further to cut by half the amount of land showing negative productivity trends during the reference period. At the sub-national level degradation priority hotspots have been identified for targeted action, including forest reserves, mining zones, refugee areas, and watersheds.

An **integrated, multi-sectoral, landscape scale approach to the delivery of voluntary LDN targets has also been emphasised** to ensure sustainability at all levels, to optimize synergies (e.g. between biodiversity conservation and sustainable development, among different sectors, and across targets set out in other multilateral agreements), and to avoid unforeseen or unwanted trade-offs (e.g. between targets set nationally versus those appropriate to sub-national scale such as individual ecosystem level), (IUCN, 2015; Okpara et al., 2018; Global Mechanism of the UNCCD and CBD, 2019).

For more information see: www.unccd.int/actions/achieving-landdegradation-neutrality

CURRENT APPROACHES TO DEVELOPMENT PLANNING AND IMPACT ASSESSMENT

Planning for development takes place at multiple scales and vary by sector and across countries and jurisdictions. To be effective, international and national goals need to be translated into national policy, legislation and development plans, which inform and govern practices on the ground. Land use planning at national, landscape and local scales is an effective tool for allocation of land to different uses across a defined area in such a way that economic, social and environmental objectives are balanced. The decision-making on land allocation can be driven by sustainable development targets - for example, in terms of the amount or type of land protected or restored. Such integrated planning is also appropriate in considering SDGs; particularly the interplay between Goals 12 (sustainable consumption and production) and 14, 15 (life under water, and life on land, respectively), (Sonter et al., 2018).

However, in reality land use planning policy and processes are not in place in many of the complex multi-use landscapes where high value biodiversity is under threat from multi-sectoral development. There are many documented instances of land allocation processes in which one sector (e.g., mining, forestry, or agriculture) develops new land use plans or grants land concessions that overlap and conflict with existing conservation areas, community forests, traditional land use rights and practises, culturally important areas, or with other economic activities (Milder et al., 2014; World Bank, 2019a).

For some sectors, environmental issues in resource development are usually controlled by the authorities in two interlinked processes. In the case of mining and oil & gas companies first apply for the rights to explore and/or exploit the resource, and then they apply for an environmental permit. For the permit, an environmental (and social) impact assessment (EIA/ESIA) process is the main regulatory tool used.

EIA/ESIA is the most known, used, and globally widespread, environmental planning and management tool (UN Environment, 2018). Legal requirements for EIA/ESIA and supporting regulations are often and increasingly the regulatory driver for applying the mitigation hierarchy[1] (see also 'Addressing impacts through a mitigation hierarchy'), ideally to achieve specified outcomes (e.g. no net loss of biodiversity but more often simply to demonstrate the mitigation of impacts to "acceptable" levels – these levels being determined by the authority as outlined by consultants to the project proponent - which leads to a potentially flawed system). It is important to stress that EIA/ESIA are not required by all sectors, projects, or activities and there are notable exemptions, particularly in agriculture and forestry, which means that some sectoral activities and projects will follow a different pathway for securing approval to proceed which may or may not involve considerations or requirements to mitigate and manage environmental and/or social impacts.

There are some advances towards integrating substantive guidance in EIA/ESIA and Strategic Environmental (and Social) Assessments (SEA/SESAs – herein after referred to as

[1] The mitigation hierarchy is the sequence of actions to anticipate and avoid impacts on biodiversity and ecosystem services; and where avoidance is not possible, minimise; and, when impacts occur, rehabilitate or restore; and where significant residual impacts remain, offset (The Biodiversity Consultancy, 2015).

SEAs) legislation, for example with regard to mitigation, such as on compensation and offsetting, and often through reference to broader government policies and targets (e.g. no net loss or a net gain in biodiversity[2]). By moving beyond a focus on procedural requirements, this can help in achieving better environmental outcomes of EIA/ESIAs and SEAs. However, understanding current gaps and weaknesses in legislation is important when considering how the mitigation hierarchy is applied to prevent, mitigate and manage impacts in a landscape.

"The ability of countries and communities to achieve sustainable development depends in no small measure on robust and effective EIA and SEA legislation and implementation as a major catalyst for overcoming current implementation gaps and achieving better environmental outcomes."

UN Environment (2018)

Given its broad utility, this section takes a closer look at the EIA/ESIA, providing a brief overview of the EIA/ESIA process. We consider some of the issues and challenges for EIA/ESIA as a tool for mitigating and managing impacts in complex multi-use landscapes. This is followed by consideration of two other key impact assessment frameworks - SEAs and Cumulative Impact Assessment (CIA). Table 1 gives a brief overview of these existing frameworks and processes, and Table 2 provides a summary of a selection of the relative strengths and weaknesses.

Table 1: Relevant existing frameworks and processes

EXISTING FRAMEWORK/PROCESS	MAIN TARGET USER/S	BRIEF DESCRIPTION
Land Use Planning (LUP) frameworks	Government, business, civil society	LUP can broadly be defined as the systematic assessment and allocation of land to different uses across a defined area in such a way that economic, social and environmental objectives are balanced. There are many land use planning policies and systems in operation, however since the 1960s there has been an evolution from top-down expert driven approaches, to integrated, multi-stakeholder approaches including integrated LUP, spatial LUP, participatory LUP, participatory rural planning, territorial ecological planning, ecosystem-based LUP.

[2] 'No net loss' is a goal for a development project, policy, plan or activity in which the impacts on biodiversity it causes are balanced or outweighed by measures taken to avoid and minimise the impacts, to restore affected areas and finally to offset the residual impacts, so that no loss remains. Where the gain exceeds the loss, this is referred to as 'net gain' (or 'net positive impact'). No net loss or biodiversity net gain must be defined relative to an appropriate reference scenario ('no net loss of what compared with what?') (BBOP, 2012c)

Strategic Environmental (and Social) Assessment (SEA or SESA)	Government May be commissioned/ overseen by multilateral development banks	SEA/SESA is a process and a tool for evaluating the effects of proposed policies, plans and programmes on natural resources, social, cultural and economic conditions and the institutional environment in which decisions are made. SEA might be applied to an entire sector (such as a national policy on energy for example) or to a geographical area (for example, in the context of a regional development scheme).
Environmental and Social Impact Assessment (EIA/ ESIA)	Government and business Government requires ESIA by proponents of specified programmes, projects, activities Proponents need ESIA as part of planning and permitting process to deliver and operate	The purpose of the EIA/ESIA is to assess and predict potential adverse social and environmental impacts and to develop suitable mitigation measures, which are documented in an Environmental and Social Management Plan (ESMP). An EIA/ESIA is applicable for projects that have been identified by the Environmental and Social Management System (ESMS) screening as high or moderate risk projects, requiring full or a partial EIA/ESIA respectively.
Cumulative Impact Assessment (CIA) / Cumulative Effects Assessment and Management (CEAM)	Government and business May be commissioned / facilitated/ overseen by multilateral development banks. Government has responsibility for and sets CIA assessment framework for business led-CIA identification and mitigation. Often part of the EIA/ESIA scope of work (i.e. chapter) for individual project applications	Framework and process for assessing and managing cumulative effects. Many of the current and developing methods and tools for CEAM/ CIA are similar to those used for EIA practice. The primary difference is related to the need to incorporate other actions and their contributions to cumulative effects on specific valued ecosystem components. Such incorporation is often done by simple modifications to existing EIA methods and tools, such as adding "other actions" questions to questionnaire checklists focused on identifying direct and indirect effects of proposed actions; modifying interaction matrices to include columns related to past, present, and future actions; and modifying network diagrams to include other actions.
Environmental permitting applications/ permission (licence or permit) / compliance	Government and business	The process by which facilities or individuals are granted permission to operate an activity which has legal restrictions placed upon it to ensure the protection of environmental quality and public health. There are different procedures depending on the activity, and permissions may have different names. Environmental permitting is often undertaken for development projects or activities that do not meet the threshold of scale or impact that would

		otherwise require a full EIA. This process is often not comprehensive and may be nested with LUP, SEA or ESIA.

Table 2: Summary of some of the strengths and gaps in existing processes

	STRENGTHS	GAPS/ WEAKNESSES
LUP	• When LUP is based on integrated or ecosystem based approaches, it provides a method for multiple objectives across sectors and interests to be considered, and encourages stakeholder participation • The CBD promotes ecosystem based LUP as their main framework for action "integrated management of land, water and living resources that promotes sustainable use in an equitable way" and an increasing number of Government policies are adopting ecosystem based approaches to land use planning e.g. in Liberia	• LUP processes that are top-down, and do not consider ecosystems and stakeholders adequately, risk further degrading natural resources, loosing important biodiversity and ecosystem service values and not adequately responding to the needs of affected communities • Limited evaluations of ecosystem-based approaches to LUP in practice • Challenging geopolitical contexts, overlapping concessions, conflicts between land uses and users, rights infringements, ecosystem degradation are challenges to Integrated LUP • When undertaken by single proponents, LUP can be isolating when not aligned to jurisdictional LUP • LUP may fail to include adequate consideration of cumulative impacts • In reality, integrated LUP is lacking or poorly applied in many countries and jurisdictions
EIA/ESIA	• Despite the long list of weaknesses in application, there is a widespread legal requirement for EIA, therefore when done to best practice and nested within an SEA, an important mechanism for mitigating project level impacts. • Credible ESIAs of specific projects can prevent irreparable damage by the project and generate conservation and social benefits, such as biodiversity protection, increased carbon storage, improved water quality and sustainable livelihoods.	• Largely reactive (as compared to SEAs) • Project by project focus of approvals • Focus of environmental and social baseline is the immediate context of the project site and aspects that relate to the identified impacts; • Induced and cumulative effects often not identified; where they are identified mitigation measures to address these more diffuse impacts rarely provided. • Environmental impacts and social impacts identified and addressed in siloes and with poor integration and assessment of relationships between social and ecological aspects, and lack of joined up mitigation actions between social and environment functions. • Limited attention to ecosystem services (supply, flow, demand) • Capacity among regulating authority to review and require improvements to EIA/ESIA and enforce conditions often limited • Power imbalances; environmental authorities may be under pressure to approve • Timelines predicated in EIA/ESIA regulations often insufficient to allow for the proper review and consultation needed on large and complex projects • Alternatives analyses often poor or non-existent and inadequate attention to avoidance of impacts • Rehabilitation/restoration measures unrealistic and/or unproven • • Not contextualised in landscape; risks and opportunities missed • Application of mitigation strategies on the ground often lacking and not monitored / evaluated adequately by company or government.

		• Impacts to environmental and social receptors can be discounted when the risks that are associated with managing the impacts or applying the mitigation hierarchy are assessed and are not deemed serious enough for the proponent to avoid or mitigate them. There are therefore unmitigated impacts and inadequately managed impacts in the Environmental and Social Management Plans.
SEA	• Proactive and 'sustainability driven' • Good approach at jurisdictional level • Covers a wider range of activities or a wider area and often over a longer time span than the EIA of projects. • Gives attention to cumulative effects issues (which should be central to these strategic studies) • SEA does not replace or reduce the need for project-level EIA (although in some cases it can), but it can help to streamline and focus the incorporation of environmental concerns (including biodiversity) into the decision-making process, often making project-level EIA a more effective process. • Considers irreplaceability of biodiversity	• Numerous definitions of SEA and varied approaches to application (e.g. as extended EIAs versus more process-oriented SEAs geared towards mainstreaming sustainability issues and capacity development) • Ecological and biodiversity aspects poorly attended to in application; or at a very high level (e.g. in sector SEA) - rough areas on a map • Issues relating to the uptake of SEA to support decision-making (i.e. not used enough as a decision-support tool) and timing (e.g. SEA being conducted too late and/or after key decisions and impacts have occurred; options to mitigate effects more limited) • Do not consider how BES responds to mitigation • Outcomes of SEA not applied, applied fully, or integrated into decision-making • Does not provide pragmatic action or activity oriented management plans to deliver change on the ground
CIA	• Recognises that proposed projects need to be analysed in relation to their location and surrounding land uses. • Strategic CIA can be more proactive in identifying and minimising the potential for cumulative effects as these effects can be addressed earlier in the planning process. • Addressing cumulative effects at strategic level also acknowledges that: i) cumulative effects can occur at different scales (sub-regional, regional, national and transboundary); ii) strategic planning authorities are in a better position than the project's proponent to address cumulative effects because of its availability of information and resources; iii) cumulative effects mitigation requires a broader approach than	• Government framework for CIA is often lacking (particularly at strategic level) • Process undermined by lack of data, uncertainty of anticipated developments, limited government capacity and absence of strategic regional, sectoral or integrated resource planning. • Where a larger scale framework is lacking, even if a business identifies no cumulative impacts from its own development, it may identify cumulative impacts in the landscape which are not being addressed • Process can be part of EIA/ESIA or standalone, however, unlikely to be required of, or conducted by or on behalf of smaller developers (e.g. smallholders) who collectively can drive cumulative impacts. • CIA processes involve continuous engagement with affected communities, developers, and other stakeholders. In practice, effective design and implementation of complete CIA processes is beyond the technical and financial capacity, and responsibility, of any single operator. There may be circumstances where it may be in the best interest of a private sector proponent to lead the CIA process,

	project-based assessment and monitoring and the necessity for multiple agency involvement	but the management measures that will be recommended as a result of the process may ultimately be effective only if the government is involved. • Often only a small chapter in a larger EIA or ESIA with inadequate scoping, description of actors and baselines in the landscape and not recognising the areas of influence or impact of other projects or the project itself. • Project-level CIA does not effectively address gradual environmental degradation from a range of activities and multiple stresses, and the interaction of multiple projects, programme and policy decisions.

Environmental and Social Impact Assessment (EIA/ESIA)

Brief description

Threatened species and environmental protection regulations have traditionally been operationalised by focusing on project-by-project impact assessments, aiming to approve, reject, or condition development projects in order to minimise impacts on threatened species or ecological communities (Whitehead et al., 2017).

EIA/ESIA is a formal, structured process intended to assess and predict potential adverse social and environmental impacts, particularly of large-scale industrial and infrastructure projects, and to develop suitable mitigation measures, prior to decisions being taken and commitments made. The main steps in the EIA/ESIA process include: (1) Screening; (2) Scoping and Impact Analysis; (3) Review of the EIA/ESIA/SEA report; (4) Decision-making; (5) Follow-up and Adaptive Management and (6) Public Participation as a cross-cutting issue (UN Environment, 2018). EIA/ESIA is typically applicable for projects that have been identified through the screening process as high or moderate risk projects, requiring full or a partial EIA/ESIA respectively.

Whilst EIA/ESIA are intended to ensure that all critical information to anticipate future impacts is considered in decision-making, it is not a process that necessarily results in environmental considerations being prioritised over other aspects, notably economic (UN Environment, 2018)

Division of competencies in the EIA/ESIA process varies, in particular whether the same agency responsible for the issuance of a permit and implementation oversight is in charge of the impact assessment process (e.g. a sectoral body), or whether a designated environmental agency is in charge of conducting or overseeing the process. In some countries specialised agencies have been established with responsibility for overseeing the EIA/ESIA system; elsewhere the process may be overseen by a sectoral body.

A range of different approaches govern the relationship between the EIA/ESIA approval process and sectoral permitting processes. The triggering factor for the EIA/ESIA process is generally a government permitting or licencing process for different development projects or activities that shape the environment. The permitting process seeks to regulate competing interests as well as alignment with government policies. The distribution of decision-making power in the approval process and follow up phase is important and varies considerably.

EIA/ESIA approval is often a legal pre-condition for the final decision on whether to issue a permit, and under what conditions. A legal arrangement where the EIA/ESIA process is intrinsically linked to government permitting processes is stipulated in most national environmental framework laws or EIA/ESIA laws (UN Environment, 2018), though this is not necessarily applied consistently in practice.

The scope and depth of the EIA/ESIA depends on the nature, complexity and significance of the identified issues, as established through screening. For a full EIA/ESIA the scope is defined by a scoping study which involves relevant stakeholders to confirm the risks identified during the screening process, to set priorities for the EIA/ESIA and to determine the types of assessments required for the EIA/ESIA. Mitigation measures are documented in an Environmental and Social Management Plan (ESMP).

Whilst EIA/ESIA is the standard approach for proponents looking to understand, mitigate and manage their impacts on environmental and social receptors, wide-ranging issues limit their effectiveness. Major constraints in the effectiveness of EIA/ESIA for preventing and mitigating impacts on human and natural systems, relate to the project-by-project and reactive nature of EIA/ESIA, which often kick in after strategic land and resource use decisions have been made and typically only when a proponent submits a formal development proposal.

Many conclude that the EIA/ESIA process in numerous contexts is not fit for purpose and is not designed nor equipped to deal with the wide-ranging expectations placed upon it today (Gillingham et al., 2016). Others suggest it has become “little more than an additional regulatory hurdle for proponents” (Doelle & Sinclair, 2006) and that for as long as EIA/ESIA processes continue to be so fundamentally flawed, new energy, extractives and infrastructure projects will continue to be major drivers of biodiversity loss and ecosystem degradation.

Despite the long list of flaws, given widespread legal requirement for ESIA, the future development and implementation of EIA/ESIA processes will be crucial in achieving sustainable development. If done well, EIA/ESIAs can be an important mechanism for mitigating project level impacts particularly when embedded within strategic impact assessments and integrated land use plans. Credible EIA/ESIAs of specific projects can prevent irreparable damage by the project and generate conservation and social benefits, such as biodiversity protection, increased carbon storage, improved water quality and sustainable livelihoods (Ascensão et al., 2018).

Guidance to support the integration of climate change considerations, human health, biodiversity and ecosystem services into impact assessment processes has been developed to improve application (e.g. see Landsberg et al., 2013; Brownlie & Treweek, 2018).

Challenges and barriers to EIA/ESIA effectiveness

The following section reviews some key issues in EIA/ESIA processes and practises. This is not intended to be an exhaustive list as there is an extensive body of literature available on the subject.

EIA/ESIAs are largely reactive and come into effect *after* key decisions have been made.

EIA/ESIAs are essentially a response to a development proposal, thus they react to rather than pre-empt the proposed project (UN Environment, 2018). Decisions relating to the allocation of timber licences, mining or oil and gas leases, or large-scale agricultural concessions typically occur long before EIA/ESIA processes come into play and with little consideration of the combined socioeconomic and ecological implications that flow from such planning decisions. "Such allocation of rights decisions effectively pre-determine the type of resource development pressures a region will experience", constraining options for development, removing opportunity for meaningful assessment of alternatives, and limiting impact mitigation now and into the future (Gillingham et al., 2016).

EIA/ESIA legislation and processes are often inadequate, non-functional, or compromised.

There is generally a broad spread of EIA/ESIA legal requirements globally, with a number of countries recently strengthening their regulatory frameworks. Yet, in some contexts there has been a trend towards weakening the EIA/ESIA process, with economic growth perceived to be unnecessarily delayed by complex, time-consuming and costly impact assessment processes (UN Environment, 2018). Often, ESIA legislation exists but may not be keeping up with current best practice (for example, requiring systematic application of the mitigation hierarchy) or is sufficiently vague leading to substantive shortcomings in application. In rare cases, there is no EIA/ESIA legislation (e.g. see Crawford & Bliss, 2017). Where legislation is aligned with international standards, capacity to apply it is often limited, thus requirements may be stipulated in law but are regularly not (fully) applied or applied consistently.

In some contexts, the authorities responsible for overseeing sectoral development (mining, energy, agriculture) exert influence over environmental authorities to override due process and streamline the EIA/ESIA process to minimise delays and accelerate approvals. Timelines predicated in EIA/ESIA regulations are also often insufficient to allow for the proper review and consultation needed on large and complex projects. As a result, EIA/ESIAs for large infrastructure projects (mining, hydropower, highways, etc.) are often inadequate (e.g., being of poor quality, giving scant attention to environmental impacts, missing entire sections on responses to impacts identified etc.), not accessible in the public domain, or are conducted after project activities have started (World Bank, 2019a). In many countries, a lack of capacity in government at relevant levels (e.g. to evaluate ESIAs and require their improvement, and to set and enforce conditions of approval) underlies many challenges in the delivery of the EIA/ESIA process. EIA/ESIAs often have to be upgraded to comply with the Environmental and Social Safeguards of international finance institutions.

Many national EIA/ESIA laws also leave high levels of discretion to implementing agencies, providing important flexibility to apply the regulations to different circumstances, yet also presenting uncertainty about the process, and inconsistency in application (UN Environment, 2018). The decoupling of the EIA/ESIA process from permitting processes further risks undermining the legitimacy and effectiveness.

Siloed approaches limit identification of impacts and mitigation options and may result in unforeseen consequences and unsustainable trade-offs

The traditional focus of impact assessment on environment means that a typical EIA has inadequate focus on social aspects. The introduction of ESIA is intended to weight environmental and social more equally. Yet in practise, more often than not environmental impacts and social impacts are identified and addressed in siloes rather than through the integrated assessment of socioecological systems. The failure to take into account the basic socioecological baseline results in a fundamental lack of acknowledgement and knowledge of how people interact with their environment and therefore what the implications of effects and impacts to the status quo will be. Ecosystem services assessments that consider ecosystem service supply, flow and demand can help address this (for example, see Landsberg et al., 2013) but to date, the integration of ecosystem service considerations in EIA/ESIA has been limited.

A lack of joined up mitigation planning across social and environment functions of an operation leads to failures to identify and manage unsustainable trade-offs between environmental, social and climate aspects. For example, social management programs that focus on natural-resource based livelihoods generation and agriculture may fail to consider the long term ecological sustainability into consideration whilst rehabilitation of impacted areas with fast-growing non-native timber and crop species risk the introduction of invasive alien species, threatening the long-term ecological function and stability of forests (World Bank, 2019b). Failures to identify and manage the socioeconomic and cultural implications of actions designed to mitigate environmental impacts (e.g. where forest protection measures affect the access and use of ecosystem goods and services) can undermine mitigation efforts and create conflict with local stakeholders.

Assessments do not capture the full extent of impacts from the proposed project.

The primary focus of EIA/ESIAs is on direct, site-level impacts; they rarely adequately consider the indirect or secondary impacts of induced human activity or development during pre-project planning, approval, and mitigation (Arlidge et al., 2018; Sonter et al., 2018; World Bank, 2019a). This is despite legislation requiring consideration of indirect and cumulative effects in many countries. Often only the most direct impacts of a project or operation are assessed, with or without ancillary infrastructure and ignoring larger-scale and longer-term consequences (e.g. effects on forest invasions, hunting, land speculation, secondary road expansion and carbon emissions) which often interact with other stressors and cumulate over space and time (Gough et al., 2008; Laurance et al., 2009; Sonter et al., 2018; World Bank, 2019a). Even international standard EIA/ESIA processes usually ignore or underestimate the multitude of secondary and cumulative effects of development projects (Laurance et al., 2009).

EIA/ESIAs are financed by the project proponent, and thus often steered in favour of the project and not the environment (UN Environment, 2018). A related failure of current project permitting and impact assessment approaches centralises on the primary assumptions framing the assessments. First, the focus is generally on the pre-decision stage with an overemphasis on the EIA/ESIA report and a perception that the report is an end product rather than a legally binding commitment (UN Environment, 2018). Second, is a focus on “delivering the project” rather than ensuring “sustainable outcomes for the project when delivered” which results in trade-offs between social and environmental impacts with economic or socio-economic benefits. This can inhibit proper recognition and application of measures to protect values or avoid and minimise impacts and to restore or recoup degraded or lost integrity in an ecosystem or landscape.

Conflation of the impact assessment with risk assessment for project proponents confounds the problem: traditional methodologies often discount impacts through the management of perceived risks rather than the assessment of impact and consequential outcomes to the environmental (biodiversity) or social (communities) receptors. This results in a failure to both fully and adequately identify impacts and failure to recognise complexity in the receiving environment or impacted area of influence. Consequently, there are unmitigated impacts and inadequately managed impacts in resultant Environmental and Social Management Plans. Failure to account for the full range of impacts is particularly damaging in sensitive environment, and in the context of multi-sectoral development and 'growth-inducing infrastructure' projects designed to trigger or facilitate resource development (Laurance & Arrea, 2017; Johnson et al., 2020).

Specific requirements for maintaining species, habitats and ecosystem functions and services are poorly addressed

The specific requirements, distribution, ecological preferences and socioecology of different species (Box 3) and the requirements for maintaining adequate supply and flow of ecosystem services in the landscape are often poorly understood and attended to.

BOX 3: RECURRENT ISSUES ENCOUNTERED IN IMPACT ASSESSMENTS AND MITIGATION PLANNING IN GREAT APE LANDSCAPES

- Integration of biodiversity and ecosystem services as core inputs into land use planning processes and SEAs has been inconsistent and inadequate.
- SEAs often miss opportunities for pre-emptive early avoidance of impacts to important ecological and social values.
- SEAs and resultant plans rarely provide pragmatic action or activity-oriented management plans to deliver change on the ground. Actions are often not taken into project level EIA/ESIAs.
- Difficulties in ensuring adequate and useful public involvement (or participation) in EIA/ESIA/SEA processes.
- Production of EIA/ESIA reports which are not easily understood by decision-makers and the public because of their length and technical complexity.
- Weak linkages between EIA/ESIA report recommendations on mitigation and monitoring, and project implementation and operation.
- Limited technical capacity to conduct and implement EIA/ESIA. Large consultancy companies are often contracted to perform EIA/ESIAs. Such companies are seldom experts in ape conservation. While the International Finance Corporation (IFC) and other development or private banks require external experts to be involved, there are no current standards as to what qualifies anyone as an expert to make decisions or advise on apes.
- ESIAs seldom use great ape specialists in the consultation process when defining impacts and potential mitigation and management options. E.g. they do not consult with the IUCN Species Survival Commission (SSC) Primate Specialist Group sections

on Great Apes and Small Apes Avoidance, Reduction, Restoration and Compensation of negative impacts from Energy, Extractive and Associated Infrastructure Projects on Apes (ARRC) Task Force which provides access to expertise within the IUCN SSC.

- Assessment of sensitive biodiversity features, such as critical habitat, is often done after activities have already been designed and begun. E.g. in Guinea, West Africa, exploratory drilling, and mining and processing plans for one company's project were in place before critical habitat studies for chimpanzees were conducted. These habitat areas need to be identified prior to any permitting or land use allocation to ensure avoidance of ape habitat.
- Study periods often too short to demonstrate clear understanding of the seasonal and medium-term natural variance in ecological and behavioural conditions.
- ESIAs tend not to take into account fundamental aspects of sociobiology and behavioural ecology of great ape species and the implications of these on impacts assessment and mitigation and management options, such as: life histories; the size of home ranges and territories; the threat of poor health and disease vectors to ape populations; great apes as keystone species that are important in e.g. the dispersal of seeds and the maintenance of ecological function and health of habitats. Consideration of the spatial and temporal implications of this in the assessment of impacts and the design of management actions is fundamental.
- Often poor consideration of impacts of noise, dust, human presence and movement in terms of disruption to great ape behaviour and socioecology (i.e. how they interact with each other both within groups or between different groups/populations).
- Inadequate consideration of the loss of composition and structure of habitat in terms of the energy budgets required by great apes to secure health and resilience with respect to breeding success, fecundity, social stability, particularly in a changing climate. E.g. loss of food sources and diversity during different times of year may impact on breeding potential.
- Inadequate consideration of induced and indirect impacts to great apes, particularly with increased threat of poaching, human-wildlife conflict, diseases exposure and transmission, competition for land from in-migration of people through increased access to ape range, and from land conversion to agriculture.
- Assessments of ape populations in a landscape are often inadequate, not taking into account the size and composition of populations required to ensure and maintain genetically robust wild populations that can survive and successfully reproduce in their natural habitats by conserving the ecological integrity of landscapes and managing their ecosystem services sustainably.
- The assessment of cumulative impacts of multiple sectors are often not taken into account, nor the ancillary infrastructure associated with each sector. It is essential to establish the true spatial and temporal influences as industrial development projects rarely occur in isolation and the environmental impacts of these projects may be magnified by other projects in the same geographical area.
- Poor attention to ecological patterns and processes when considering EIA/ESIA in ape range. Species viability in forest patches depends on many factors, including the area of habitat, the size and shape of habitat patches, and the connectivity between patches. Not only does fragmentation disrupt the distribution and abundance of species, but it also affects the ecological processes that are part of the ecosystem (Leader-Williams & Dublin, 2000). Management and mitigation plans therefore need to consider what makes most ecological sense for ape conservation (Kormos et al., 2014).

- The mitigation hierarchy is poorly applied with little attention given to avoidance and minimisation aspects, particularly in terms of ecological context at a functional spatial and temporal scale.
- There is often an assumption that residual impacts are offsetable for great apes. The basic premise, as recognised by IFC, is that all great apes are critical habitat species and net gain outcomes for the species need to be designed into any management actions designed to mitigate development activities in a great ape landscape.
- When assessing baseline populations and great ape habitat, the need to avoid critical ape habitat from the outset is poorly addressed. Project proponents tend not to work with government or civil society stakeholders to ascertain such avoidance areas and do not proactively declare areas of avoidance. This needs to be done prior to decision-making on development activities across all sectors.
- Priority focus needs to be placed on improving mitigation of negative impacts to apes. With many apes living outside of protected areas, not only is there a need for increased protection of their habitat, but better management of the ecosystems in transition zones that are not currently protected.

Risks and mitigation options rarely contextualised in the wider landscape, over appropriate temporal scales, and in the context of other threats and pressures.

Impact assessments of individual projects rarely consider the wider landscape context and potential for cumulative and cross-sectoral impacts in conjunction with other regulated and unregulated developments and stressors (Baird & Barney, 2017; Whitehead et al., 2017; Sonter et al., 2018). Assessment processes tend to be constrained by a limited geographic and temporal scope that restricts the consideration of impacts to those that are “reasonably foreseeable” and within the defined Area of Influence, which typically underrepresents the true extent of impacts over space and time (Gillingham et al., 2016). In Brazil, for instance, EIA/ESIAs of major new Amazonian highways were confined to a narrow swath along the road route itself, sometimes recommending such minor mitigation measures as “helping” animals to move from the planned route before road building (Gough et al., 2008). Uncertainty over future stages of development or of the associated induced or cumulative effects is often used to justify their exclusion from impact assessment (Johnson et al., 2020).

Project by project approvals fail to take the wider landscape context and cumulative effects into account in decision-making and exemptions in the triggering activities for EIA/ESIA mean some major drivers of land conversion are not subject to EIA/ESIA

The project-level focus of EIA/ESIA is problematic in terms of development planning and decision-making at a broader scale because when individually assessed, a project may be approved on the basis of individually manageable impacts. However, when considered in conjunction with the impacts of multiple discrete and/or consecutive projects as well as other unregulated developments and various natural and societal stressors in a landscape, they may cumulatively lead to “death by a thousand cuts” (Whitehead et al., 2017; World Bank, 2019a).

This is exacerbated by the fact that certain land uses and activities are exempt from the EIA/ESIA process (e.g. due to their smaller size) and are therefore not legally required to apply the mitigation hierarchy. For example, according to Liberia’s Environmental Protection and Management Law (2002) EIA/ESIA triggering activities are required for agricultural cultivation of natural and semi-natural areas only where these activities are planned over 50 hectares. In Guinea, the Forest Code and implementing legislation of 2015 includes a requirement for an environmental impact statement for projects involving forest clearance of more than 10 hectares but an EIA/ESIA is required for projects involving clearance over 50 hectares. Forest clearance relating to small farms under 10 hectares are not subject to environmental clearance. In some contexts, such smaller scale activities and their cumulative effects are major drivers of habitat and biodiversity loss.

Inadequate requirements for and compliance with the mitigation hierarchy and poor timing of its application

Whilst legislation in many countries includes provisions supportive of mitigation hierarchy application (e.g. referring to 'avoiding' and 'mitigating' impacts, requirements for the rehabilitation of impacted areas etc., and provisions or requirements for biodiversity offsetting) an explicit reference to and definition of the mitigation hierarchy are often not included in national EIA/ESIA (or SEA) legislation (UN Environment, 2018). Where the legislation makes provision for, or requires, application of the mitigation hierarchy, a core issue associated with environmental assessment practice relates to inadequate compliance and poor timing in mitigation hierarchy application.

For example, alternatives analyses are often poor or non-existent; baseline data used in the EIA/ESIA may be insufficient to inform appropriate and effective mitigation responses; there is inadequate attention given to the avoidance of impacts - options for which are already likely constrained by land use and resource decisions that pre-empt the EIA/ESIA process; rehabilitation and/or restoration measures are often unrealistic and/or unproven; and the application of mitigation strategies on the ground is often lacking and not monitored and evaluated adequately by company or government. See 'Addressing impacts through a mitigation hierarchy' for more detailed discussion.

Failure to assess the ability of the proponent to mitigate and manage impacts

The ability of proponents to finance and implement required mitigation measures to achieve specified results is not considered adequately or not at all. Poor financial and legal mechanisms for delivery of mitigation and challenges in securing the necessary funds and resources are a major issue contributing to recurrent failures in the delivery of required mitigation and compensation.

EIA/ESIA processes rarely facilitate inclusive dialogue and debate and meaningful stakeholder engagement

Public participation requirements, whilst being expanded in some countries, are typically limited to scoping and review stages of the process and the level of required participation is highly variable. Few countries legally require participation of indigenous peoples (UN Environment, 2018).

The integrity of the EIA/ESIA process in presenting the risks associated with loss of ecological function and health are often not well presented or transparent, feedback from affected stakeholders is often stifled, poorly dealt with, and/or may not be incorporated into project planning in any meaningful way. The human health and welfare impacts associated with the development are often inadequately addressed.

Government and proponents typically emphasise the positive benefits of economic growth and underplay associated risks and costs, particularly over the long-term. Whilst there may be benefits to local economies over the short-term, as a result of growth associated with the infrastructure construction and operation, this is often to the benefit of outside workers and businesses and communities that come to rely on the newly established operation may suffer the effects of boom and bust cycles, market volatility and through the wide-ranging direct and secondary effects of the development and associated or induced development (Gillingham et al., 2016; Johnson et al., 2020) .

Evidence also suggests that even when ecological damage is anticipated and there is a corresponding loss of livelihoods, local communities may enter into negotiations that focus on employment opportunities, economic compensation, small local business promotion, and the implementation of education, health and other social development projects. Failure to provide transparent and accessible information on the full range of impacts arising from project development and social management projects over space and time, implications for the health of ecosystems, local communities and landscape sustainability and resilience continues to allow impacts to go unacknowledged, unmitigated and uncompensated.

Strategic Environmental (and Social) Assessment

To evaluate the overall impact of projects on human and natural systems, it is essential to go beyond traditional site-level assessments of direct impacts and take an integrated landscape-level approach (World Bank, 2016). SEAs are the planning counterpart of EIA/ESIA. Intended to be pre-emptive and proactive, SEA provides a systematic evaluation of the anticipated environmental, economic and social consequences of proposed policies, plans and programmes, ensuring that they are appropriately addressed at the earliest stage of decision-making. SEA covers a wider range of activities or a wider area and often over a longer time span than the EIA/ESIA of projects and should give attention to cumulative effects. There are numerous definitions of SEA and varied approaches to application (e.g. as extended EIA/ESIAs versus more process-oriented SEAs geared towards mainstreaming sustainability issues and capacity development).

SEA is key in identifying credible alternatives fundamental to sustainable development (Ascensão et al., 2018). SEA can be applied to an entire sector (such as a national policy on energy, or development of the mining sector), to a geographical area or region (for example, in the context of a regional development scheme) or both (e.g. in the development of mining across a mineral province) – see also Box 4.

SEA is therefore a good approach at a jurisdictional level and, when project developments happen after broader policy of planning decisions, there can be a direct link between the application of SEAs and individual EIA/ESIAs for projects that arise through implementation of the policy or plan (UN Environment, 2018). SEA does not replace or necessarily reduce the need for project-level EIA (although in some cases it can), it can help to streamline and focus the incorporation of environmental and social concerns (including biodiversity) into the decision-making process, often making project-level EIA a more effective process.

The trigger for SEAs is the intention of a government agency to adopt a plan, programme or policy. The need for growth-inducing projects to trigger SEA or equivalent processes has also been emphasised (Whitehead et al., 2017; Johnson et al., 2020), given the role they play in stimulating broader economic development and cumulative impacts that far exceed the impact of the initial project alone. Legal SEA requirements are generally only binding for public institutions and so are generally initiated by the same public institution and only in some cases overseen by another body, for example a central environmental authority. Political commitment, trust in and legislative backing to the SEA process, are considered important elements for SEA effectiveness (UN Environment, 2018).

BOX 4: SEA FOR THE DEVELOPMENT OF THE MINERALS SECTOR IN THE MANO RIVER UNION, WEST AFRICA

The West African Mineral Sector Strategic Assessment - a strategic environmental and social assessment intended to identify policy, institutional, and regulatory adjustments required to integrate environmental and social considerations into mineral sector development in the Manu Region in West Africa. The assessment focused on three Mano River Union countries, Guinea, Liberia, and Sierra Leone, all categorized as mineral-rich countries which earn — or could earn (in the case of Liberia) — significant revenues from exports of bauxite, iron ore, rutile, gold, and diamonds. This SEA featured an analytical component, and an extensive consultation process designed to initiate a policy dialogue on improving mineral sector governance and enhancing the benefits of mineral sector development for the Mano River Union region. The recommendations were intended to provide guidance to the African Mineral Governance Program and Extractive Industry Transparency Initiative Plus Plus (EITI++) initiatives that were gathering momentum in the region at that time.

Source: World Bank Environment and Natural Resources Management Unit of the Africa Region (AFTEN) & Environment Department (ENV), 2010

As mines, oil & gas developments, infrastructure and large-scale forestry and agribusiness projects are rarely isolated events, regional scale strategic impact assessment and development planning is essential to avoid death by a thousand cuts and to exploit efficiency gains (Sonter et al., 2018). The strategic assessment and management of environmental and social impacts at a landscape scale *before* land use allocation decisions are made and project proposals are tabled can deliver wide-ranging benefits: balancing social, environmental and economic priorities, improving mitigation hierarchy implementation and avoiding costly and irreversible impacts on society and the environment (Ascensão et al., 2018; Bigard et al., 2020; Johnson et al., 2020). Such strategic and pre-emptive planning and decision-making processes are essential to guide land use allocation to achieve multiple benefits, avoid large-scale biodiversity losses and to prevent the degradation and loss of ecosystem function and resilience (SANBI & UNEP-WCMC, 2016).

SEAs that consider ecological and sociocultural values alongside development scenarios can help improve understanding of the direct, indirect, and cumulative impacts of single or multiple sector developments on natural and social systems, inform application of the mitigation hierarchy, including identification of avoidance priorities and potential biodiversity offset options and identify issues that require cross-sectoral engagement and collective action at a landscape scale.

To overcome some of the limitations of EIA/ESIAs regarding the considerations of cumulative effects (and alternatives), the importance of SEAs is increasingly recognised

(UN Environment, 2018). The role of SEAs in modelling induced impacts and identifying alternatives (e.g. avoiding areas with high biodiversity and/or carbon values) at the design-stage of transport and other major infrastructure developments has been emphasised as important in promoting forest-smart investments (World Bank, 2016). Such strategic and pre-emptive decision-making processes are especially important in areas that are home to sensitive or threatened biodiversity, support high levels of endemism, ecological intactness and that provide ecosystem services with local and global significance (e.g. through their role in regulating hydrological services or carbon sequestration and storage), (Johnson et al., 2020).

The benefits are further evident in examples of well-planned transport infrastructure that avoid ecologically sensitive areas, increase employment opportunities, reduce transport costs, and are better aligned to benefit local communities and agriculture (Ascensão et al., 2018). In the Amazon, for example, research has demonstrated that the strategic prioritisation of fewer road development projects in carefully chosen locations could dramatically improve environmental, social and economic outcomes whilst mitigating adverse impacts on forests, biodiversity and ecosystem services (Vilela et al., 2020).

Despite some promising developments in different parts of the world development and **implementation of SEA legal requirements has been slow in many countries** (UN Environment, 2018), with the shift towards rigorous, pro-active and biodiversity inclusive application of SEA as a tool to guide landscape level planning proving challenging and with limited uptake in contexts where it is arguably most needed. In practice, there are few examples of landscape-level, integrated approaches, strategic EIA/ESIAs or even coordination of individual EIA/ESIAs on the ground, to identify, manage, or monitor the impacts of multi-operator or multi-sector activities on biodiversity, ecosystem services and natural resource dependent communities (World Bank, 2019b).

The integration of biodiversity and ecosystem services as core inputs into SEAs continues to be inconsistent and often poorly attended to (Bigard et al., 2020) and rarely do such strategic assessments consider how biodiversity and ecosystem services may respond to cumulative effects and to proposed mitigation strategies. Moreover, despite growing recognition of SEAs as a tool to strengthen democratic control, little guidance is provided in many countries' SEA legislation regarding public participation, including access to information.

Prevailing shortcomings in SEA are also evident, often linked to legal approaches being rooted in the logic of EIA/ESIA systems and not taking into account the particularities of strategic planning processes, that provisions may be lacking legal force, and the significant challenges of explicitly having to deal with huge uncertainty (Sonter et al., 2018; UN Environment, 2018). There is often little guidance in legislation around public participation in SEA processes.

The **timing of SEA** is important. Many SEAs are initiated once a first version of a plan, programme or policy has been drafted, thus once a number of important (strategic) decisions related to the plan, programme or policy have already been made. In these cases, SEAs evaluate different development scenarios (including alternatives and their cumulative impacts) and prepare a SEA report which might be subject to external or public review, prior to the adoption of the plan, programme or policy. In other cases, SEAs are introduced earlier on in the decision-making process, at the time of setting strategic aims and goals and therefore regularly having a wider spectrum of alternatives (Lobos & Partidario, 2014)

The long period for a strategic planning document to materialise also presents serious challenges for follow-up and adaptive management of SEAs, often compounded by capacity constraints in the plan, programme or policy executing agency to implement required mitigation measures and to avoid adverse environmental impacts, as well as the difficulty to attribute environmental changes to a single strategic planning instrument (UN Environment, 2018). In contexts where multi-sectoral development is already underway and progressing at pace there is a **risk that the ecological and social landscape may be irreversibly changed before strategic planning is complete** and recommendations are under implementation. As with EIA/ESIAs, the results and recommendations of SEA are not always used to inform strategic or even project-based decision-making and often lack pragmatic action or activity-oriented management plans to deliver change on the ground.

Cumulative Impact Assessment

Cumulative Impact Assessment (CIA) - also referred to as Cumulative Effects Assessment and Management – is a framework and process for assessing and managing cumulative or additive effects. Assessment involves analysing the potential impacts and risks of proposed developments and how they may combine, cumulatively, with the potential effects of other human activities and natural environmental and social stressors (e.g. droughts or extreme climatic events) on the selected ecosystem components over time. Concrete measures are devised to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible (IFC, 2013). CIA recognises that proposed projects need to be analysed in relation to their location and surrounding land uses.

Project-level CIA supports the integration of cumulative effects considerations into project approval procedures. A CIA may be stand-alone or incorporated into the EIA/ESIA process. Many countries legally require the consideration of cumulative effects in project-level EIA/ESIA yet **few projects adequately consider cumulative impacts** whether resulting from one project's subcomponents or ancillary developments, or in combination with other existing or anticipated future developments and threats. In cases where cumulative effects are identified by project proponents, this typically forms only a small chapter in a larger EIA or ESIA, comprising qualitative description of possible effects, often with inadequate scoping, description of actors and baselines in the landscape and not recognising the areas of influence or impact of other projects or the project itself. Moreover, **mitigation measures to address these more diffuse and complex impacts are rarely provided** or integrated into the resultant management plans and often there is little expectation on the part of the regulator for individual proponents to do so (World Bank, 2019a).

Given that cumulative effects can occur at different scales (sub-regional, regional, national and transboundary), **project-level CIA can rarely adequately address issues of gradual environmental degradation** from a range of activities and stressors, and the interaction of multiple projects, programmes and policies. CIA processes should involve continuous engagement with affected communities, developers, relevant government ministries and departments and other stakeholders. In practice, effective design and implementation of complete CIA processes is often beyond the technical and financial capacity of a single developer (Gillingham et al., 2016) and often there is no mechanism by which companies can come together to identify and address cumulative effects (World Bank, 2019a). Cumulative impacts are therefore generally considered to be the responsibility of government. Even in situations when it is in the best interest of a private sector developer to lead the CIA process, recommended management measures resulting from the process will ultimately only be effective if government is involved. Yet in many contexts there are few mechanisms to help coordinate across ministries and sectors, and between government, private sector and civil society (Baird & Barney, 2017; World Bank, 2019a).

Strategic-level CIA tends to use planning principles and procedures to support the avoidance and management of cumulative effects at regional or landscape scale decision-making. Given the information needs and necessity for multiple agency involvement, strategic-level assessments led by planning authorities are better placed than individual project proponents to identify and address cumulative effects, convene relevant stakeholders, and monitor outcomes of mitigation action. A strategic approach to CIA can be more proactive in identifying and minimising the potential for cumulative effects as these effects can be addressed earlier in the planning process. Strategic-level CIA is closely related to and should be an integral component of regional SEA and land use planning processes. It therefore also shares many of the same challenges. In addition, strategic CIA faces the considerable challenge of having to deal explicitly with huge uncertainty in scenario planning and the analysis of possible impacts and effects (Johnson et al., 2020).

Cumulative impacts arising from multisectoral development have stretched political systems that have traditionally been geared toward the regulation and management of individual resource developments, presenting challenges for policy makers, developers, and civil society actors. Given the tendency for regulatory systems to examine circumstances on a sectoral basis, cumulative impact assessments **often focus on a single sector** (e.g. multiple mines) rather than taking into account cross-sectoral, cumulative effects across a landscape at relevant temporal and spatial scales. Structural division and compartmentalisation of land and water management (including the regulation of large projects affecting terrestrial versus aquatic ecosystems) has further contributed to this **segregated approach** (e.g. assessments for multiple hydropower dams or tree plantations, rather than both considered together), (Baird & Barney, 2017). Yet species, habitats, ecosystem services and human livelihoods often cross the water-land divide. Cumulative impacts are thus overlooked and outcomes underestimated, in turn **allowing developers to under-mitigate and under-compensate** for cross-project and sector impacts on human societies and natural systems (Baird & Barney, 2017).

Many of the current and developing methods and tools for CIA, particularly in the context of project-level CIA, are similar to those used for EIA/ESIA practice (International Association for Impact Assessment, 2020). The primary difference is related to the need **to incorporate other actors in the landscape and their contributions to cumulative effects** on specific valued ecosystem components. Such incorporation is often done by simply expanding the spatial and temporal scope existing EIA/ESIA methods and tools (e.g. adding 'other actions' questions to questionnaire checklists focused on identifying direct and indirect effects of proposed actions; modifying interaction matrices to include columns relating to past, present and future actions; and modifying network diagrams to include other actions).

Spatial prioritisation needs to explicitly consider cumulative impacts of multiple proposed developments on multiple species over large spatial scales (Sonter et al., 2013; Whitehead et al., 2017; Johnson et al., 2020). Often cumulative impact assessments focus on evaluating the impacts of multiple interacting stressors at a site level and the use of coarse surrogates for species persistence such as ecosystem types are used with little or no reference to the requirements, distributions, or persistence of individual species (Whitehead et al., 2017). These approaches tend not to explicitly consider spatial accumulation of impacts, nor the impacts that multiple developments might have on the connectivity and viability of species populations, rendering them inadequate for assessing impacts to rare, sensitive and threatened species (Whitehead et al., 2017). Greater efforts are needed to encompass the full array of impacts caused by different sector developments and activities and to deal with those mitigation actions that only partially, or take time to, mitigate impacts (Sonter et al., 2018).

Other contributing factors undermining the utility and effectiveness of CIA include lack of government frameworks for CIA, lack or inaccessibility of data, uncertainty of anticipated developments, limited government capacity, and the absence of strategic regional, sectoral or integrated resource planning (Cooper & Sheate, 2004). All too often, nobody is taking responsibility for identifying and addressing cumulative effects (World Bank, 2019b).

Other drivers of better practice

Voluntary standards, certification and assurance schemes

A plethora of standards

Voluntary sustainability standards and safeguards are mechanisms that can be used to track and reduce business environmental and social impact, improve transparency, and promote best practice (FFI et al., 2019). Voluntary sustainability standards are market-based tools to address key social, economic and environmental issues in production and processing. They are developed to assure consumers, retailers, investors and other supply chain actors that the products they buy have been produced, traded and processed sustainably. Safeguarding policies, in the case of the World Bank for example, are instruments applied to protect the interest of the beneficiaries, clients, shareholders and the financial institution itself. All standards are a type of safeguard, but not all safeguards are standards in that not all safeguards requirement certification or third party verification. Performance standards and requirements are a subset of environmental and social safeguards (FFI et al., 2019).

Standards present an opportunity to promote best practice to ensure sustainability principles are applied through good social and environmental governance. A proliferation of voluntary mechanisms have emerged to help manage operational supply chains, improve business sustainability and contribute towards global sustainability goals. Many voluntary standards are supply chain focussed and offer segmented approaches designed to target:

- specific sectors such as mining (Initiative for Responsible Mining Assurance - IRMA), agriculture (Rainforest Alliance, the Roundtable on Sustainable Palm Oil - RSPO, Round Table on Responsible Soy - RTRS, Bonsucro etc.), forestry (e.g. Forest Stewardship Council - FSC), infrastructure (Standard for Sustainable and Resilient Infrastructure - SuRe)
- groups (e.g. such as the Alliance for Responsible Mining, Better Gold Initiative, Fairmined Standard for Gold and Associated Precious Metals, all of which are aimed at small-scale or artisanal miners)

- different commodities or sub-sectors (e.g. specific crops such as palm oil, bananas, coffee, cocoa, rubber etc.; metals or minerals such as gold, bauxite, steel and tin)
- particular resource issues (such as water or deforestation).

Each standard offers its own approach and particular requirements for dealing with impacts and improving sustainability. In this rapidly evolving space **new standards are constantly emerging, adding confusion** to an already busy market. With over 400 standards available, there is concern that initiatives are **numerous, duplicative but not comprehensive** and questions have been asked about the effectiveness of voluntary schemes in driving positive change (Mori Junior et al., 2016; Brad et al., 2018; FFI et al., 2019).

The dynamic role of finance

Access to capital is an important driver for responsible practice in some sectors, such as mining (World Bank, 2019a). Projects seeking finance from the IFC (which finances development totalling in the region of USD19 billion per year) must adhere to best practice which includes requirements to achieve no net loss or net gain for prioritised biodiversity and to do so through adherence to the mitigation hierarchy (see 'Addressing impacts through a mitigation hierarchy'). In addition, 96 other financial institutions (jointly lending approximately USD250 billion per year), have broadly aligned their own biodiversity and ecosystem service standards with IFC Performance Standard 6, through the adoption of the Equator Principles which govern approximately 80% of the global project finance market (FFI et al., 2019). However, the relatively late and short-term engagement of multilateral development banks and other lenders in the projects they lend to can undermine the credibility of any threats to withdraw funding in the event of noncompliance and limit effective application of safeguards. Lenders are also not well-placed and lack capacity to enforce safeguards.

The **growing role of Brazil, Russia, India, China and South Africa (BRICS) in financing economic developments globally**, including across Africa (e.g. through the Asian Infrastructure Investment Bank (AIIB), New Development Bank, the China Export-Import Bank (CEIB), and Brazilian Development Bank (BNDES), among others) is, however, increasingly rivalling traditional multilateral lending. The two largest beneficiary sectors of Chinese investments are energy, in particular hydropower, and transport (mostly roads and railways), (Vargas, 2017) and China now wins more construction contracts from the World Bank than any other country in the world, with Chinese companies winning almost a third of all World Bank infrastructure projects in Africa between 2007 and 2015 (Olander 2016 cited in Vargas, 2017). Though Brazil's investments in Africa are less than other financial institutions, they are on the increase with the BNDES expanding its activities into new countries such as Ghana (Vargas, 2017).

According to reports, **many of these banks would fail to meet the environmental standards, procurement requirements and other safeguards** adopted by the World Bank and the Asian Development Bank (ADB) (FFI et al., 2019). Neither the CEIB nor the BNDES have a specific biodiversity standard and neither explicitly acknowledge biodiversity or key issues such as international wildlife trade in their respective environmental policies (Vargas, 2017). The influence of these and other alternate sources of development finance risks further **weakening the enforcement mechanisms of existing multilaterals** (FFI et al., 2019 and references therein) and **enabling the development of large infrastructure projects that would otherwise not have moved beyond the planning and design** phase (e.g. Kirchherr et al., 2016).

Investors in the agricultural sector are increasingly interested in how companies are addressing material risks related to land: according to Ceres, of the 130 sustainability-focused resolutions filed with food and beverage companies since 2011, over a third are related to deforestation concerns (FFI, 2018). However, the **role of finance in driving sustainability in agriculture and forestry differs** from major infrastructure and extractives sectors. For example, many companies do not need access to foreign capital and thus are not influenced by requirements of the IFC Performance Standards (e.g. for no net loss and net gain of biodiversity) or other similar financial sector policies (Aiama et al., 2015). Where finance is sought, agribusiness often accesses different types and scales of financing and from different sources compared to extractives and infrastructure.

There is a **growing body of research, guidance and legislation related to investment standards for agricultural businesses**. Legislation is handled nationally, with some countries passing specific laws related to foreign agricultural investment: an example of this is Burkina Faso's 2018[3] agriculture investment code, which enshrines concepts of sustainable agricultural development into law. Most countries do not have such a code yet. In Guinea, Liberia and Sierra Leone, for example, there is guidance that agricultural investments should adhere to national environmental codes in general terms though the robustness of environmental laws, their application and the extent to which they are mainstreamed varies.

In 2014, the Committee on World Food Security endorsed its **Principles for Responsible Investment in Agriculture and Food Systems**, known as the CFS-RAI. The CFS-RAI establishes a set of fundamental principles for all stakeholders in relation to agricultural investment. There are 10 Principles with Principle 6 in particular addressing aspects of the mitigation hierarchy as they relate to responsible investment: "Preventing, minimising, and remedying, as appropriate, negative impacts on air, land, soil, water, forests, and biodiversity" (Committee on World Food Security (CFS), 2014). Adherence to the CFS-RAI guidelines is voluntary.

A number of **financial institutions have adopted specific policies for agribusiness lending**, but the extent to which these policies are applied remains unclear, in part due to weaknesses in disclosure practices (Arcus Foundation, 2015). 'Green' financiers often have requirements to manage environmental impacts. For example, &Green finances agricultural projects which 'provide substantial environmental returns', these include 'avoided deforestation', 'restored forest' and 'conserved forest', which could be met by applying the mitigation hierarchy, though this is not stipulated. In general, the application of the mitigation hierarchy is not a requirement where financial institutions are lending to agribusinesses.

Certification schemes and supply chain initiatives in agriculture and forestry

In both agriculture and forestry, voluntary standards and certification systems have been the primary vehicle for promoting sustainability with sector or commodity specific standards and certification schemes having been widely adopted. Such standards are also favoured by IFC Performance Standard 6 for providing finance to agriculture and forestry projects implementing best or responsible practices, though typically these do not include no net loss or net gain objectives for biodiversity (Aiama et al., 2015). Demand for standard-compliant produce is also reported to be outpacing demand for

[3] http://www.fao.org/faolex/results/details/en/c/LEX-FAOC180804/

conventional products across eight agricultural sectors and on track to account for 10 per cent of global production by 2020 (Potts et al., 2017). The following trends have been documented:

- The total area covered by voluntary sustainability standards for eight agricultural commodities (banana, cotton, coffee, cocoa, tea, sugar, palm oil and soybean) reached 14.5 million hectares in 2014 which was less than 1% of the global agricultural area (Potts et al., 2017).
- The State of Sustainable Markets Report (Lernoud et al., 2018) reveals highest growth rates (2011-2016) in terms of certified area in cotton, cocoa and tea, with approximately 23% of the world's cocoa area now certified by four standards and 25.8% of the coffee area being certified.
- In 2016, organic was the largest sustainability standard in terms of area and product variety, and more than 57.8 million hectares of agricultural production were certified as organic (Lernoud et al., 2018); representing 1.2% of the agricultural land worldwide.
- RSPO has the third largest standard by area with certification extended over 3.2 million hectares in 2016 (Lernoud et al., 2018).
- Whilst the certified forestry sector accounts for almost 11% of the global forestry area experienced an increase in certified area between 2011 and 2016, Africa and Asia had the lowest percentage of certified forestry by area at just 2% and 4% respectively in 2016 (Lernoud et al., 2018).
- There is rapid growth in certification, however the distribution of where certification occurs is limited; 133 countries had certified cropland, and 31 countries classified as low income countries by the World Bank have little certification coverage (FFI et al., 2019).

Voluntary schemes in agriculture are often set up with a focus on minimising impacts of large agribusiness owned plantations, but many have now incorporated standards for smallholders and other supply chain actors (mills, traders, buyers, etc.) as adjunct components to the core standard. Standards tend emphasise implementation of responsible onsite management practices (e.g. responsible agrochemical use, water and soil use, waste management) rather than achievement of defined conservation goals (Aiama et al., 2015). While none of the voluntary standards in these sectors explicitly adopt and apply the mitigation hierarchy or require no net loss or net gain approaches, the best practices required to meet the standard do include methods to avoid, minimise, and occasionally restore or offset impacts.

The concept of High Conservation Value (HCV) areas has been incorporated in a number of forestry and agricultural standards. An HCV is a biological, ecological, social or cultural value of outstanding significance or critical importance. There are six categories of HCV: 1) species diversity, 2) landscape level ecosystems, 3) ecosystems and habitats, 4) ecosystem services, 5) community needs, and 6) cultural values. The HCV concept was developed to form part of the FSC certification standard, to ensure maintenance of significant environmental and social values. Over time the HCV concept has been adopted by other certification schemes (e.g. in agriculture) and by other organisations and institutions that aim to maintain and/ or enhance significant and critical environmental and social values as part of responsible management (Brown et al., 2017). However, there remains limited evidence of the HCV approach having an impact on biodiversity conservation, particularly in the agriculture sector (Aiama et al., 2015).

Are standards driving supporting biodiversity conservation on the ground?

There are examples that highlight the role that sectoral standards and the standards of those financing economic development projects can play in driving change in policy and practice at the company and national level. For example, in contexts where regulatory drivers are weak, voluntary standards and safeguards can be the primary driver for improvements in practice (e.g. World Bank, 2019b). In forestry, certification has also led to some positive changes in practises around HCV areas, but the impact on deforestation at the landscape level is unclear (Auld et al., 2008). Others suggest that FSC and Programme for the Endorsement of Forest Certification (PEFC) may be linked to environmental benefits compared to non-certified conventionally logged forests, with FSC having a positive impact for fauna, flora and ecosystem services over boreal, temperate and tropical ecosystems (Di Girolami & Arts, 2018). However, the evidence overall, is both limited and very mixed as to whether voluntary standards and safeguards are currently delivering positive outcomes for biodiversity conservation and there remains a lack of documented evidence of their effectiveness at the landscape scale.

A recent review by FFI et al. (2019) explored the role of voluntary standards and safeguards in conservation and found that voluntary standards with low sector coverage, low target achievement within the standard and poor target ambition appear not to be effective in supporting biodiversity conservation. The extent to which there is uptake of safeguards and standards within a landscape is also important. Taking the example of ape range landscapes in Africa, of the IFC's funded energy, extractive and associated infrastructure projects only four were disclosed in ape ranges, including the Sierra Rutile mining development in Sierra Leone, the Guinea Alumina Corporation mining development and the Compagnie des Bauxites de Guinée mining development - both in north-west Guinea, and the Dugbe Gold Project in Liberia (IFC, 2019 reported in Howard, 2019). Thus, the influence of international finance at the landscape level may be limited given the numerous and increasing number of active mining (and other resource development) concessions in these landscapes.

FFI et al. (2019) suggests that voluntary standards can be most effective for achieving biodiversity conservation where they have clear targets and reporting requirements, third party monitoring and evaluation, and when voluntary standards are used alongside policy instruments or as an interim for policy development (e.g. development of mandatory national or jurisdictional palm oil standards to complement RSPO certification requirements).

Overall, whilst some voluntary standards are contributing towards relevant environmental and social objectives, collectively they are proving insufficient in delivering the scale and pace of change that is needed to address systemic sustainability issues (e.g. accelerated rates of forest loss, species extinctions, irreversible ecosystem degradation, water crises, food shortages, insecurity of energy supply), (Rivera & Blackman, 2010; Mori Junior et al., 2016; WBCSD et al., 2017).

There is also concern that a deepening shift towards the regulation of agricultural and forest landscapes through corporate social responsibility standards and private certification systems (and a more recent shift to company-owned schemes that are developed internally and not third party audited) generally discourages integrated landscape approaches and evaluations of cumulative and cross-sectoral socioecological impacts (Baird & Barney, 2017). Corporations do not generally have a specific mandate to protect the broader public interest, and private certification systems such as the FSC are ultimately sector- and project-specific standards, and like other certification standards scope will generally be limited to the property boundaries and criteria (Kissinger et al., 2015).

The need for greater coherence, interoperability, cross-recognition, and consolidation of the array of standards has been highlighted (Mori Junior & Ali, 2016) with calls for a more holistic approach to production with higher transparency across the whole supply chain (Brad et al., 2018). Moreover, with growing understanding of the complex, interconnected drivers of environmental and societal issues (e.g. biodiversity loss, water crises, climate regulation and adaptation, livelihoods, spread of disease and health, food security etc.) the **need for more integrated, coordinated and cross-sectoral action at the landscape level has been highlighted** (Gross et al., 2016; WBCSD et al., 2017). This is reflected in, for example:

- a growing focus on deforestation-free and net positive landscapes e.g. the state of Sabah in Malaysia is exploring the potential for a net positive landscape to help designate and protect forests through an integrated approach involving all land use sectors (Sabah Forestry Department, 2018; FFI, 2018),
- commodity focussed certification schemes, such as RSPO, evolving to jurisdictional certification: a transition intended to complement existing approaches (see Box 5),
- development of standards, such as LandScale, designed to assess and track progress towards landscape sustainability (Box 6).

BOX 5: JURISDICTIONAL APPROACH OF THE RSPO

The RSPO is pursuing a Jurisdictional Approach to certification, to ensure all producers in a certified jurisdiction are compliant with RSPO Principles and Criteria. The Jurisdictional Approach aims to scale up RSPO adoption to a wider production area, thereby addressing sustainability issues related to palm oil more effectively. The process will involve improved stakeholder engagement, with a particular focus on government involvement, in order to make a larger positive impact than is possible through the certification of a single producer. In an environmental context this is important for addressing large scale ecosystem impacts. For example, palm oil producers in a certified jurisdiction would all be required to protect and restore riverine buffer zones, therefore ensuring habitat connectivity through the jurisdiction. The approach reflects the growing support for and interest in landscape and jurisdictional approaches in the agricultural sector (Proforest, 2016; FFI, 2018).

BOX 6: MONITORING SUSTAINABILITY PERFORMANCE OF LANDSCAPES

The shift in the need for accountability and rising expectations from the finance sector and consumers of better practices by all industrial players within complex landscapes has been a contributing factor in the development of LandScale. This is a new assessment approach that seeks to provide an impartial, holistic and globally recognised system for assessing the cumulative effects of activities in landscapes dominated by natural resource-based industries (e.g. agribusiness, forestry, extractives, tourism) and tracking progress towards more sustainable and resilient outcomes. Companies, industry initiatives, governments, financial institutions, NGOs and donors working at the landscape level can use LandScale to measure the sustainability status of a landscape, track trends, inform decision-making, and credibly communicate impact.

Assessments can be conducted by a single entity, a group interested in developing a collaborative landscape initiative, or an existing multi-stakeholder landscape partnership. The assessment framework itself comprises a set of goals related to improvements in ecosystem health, human well-being, governance and production of key agricultural and forestry crops. These are underpinned by indicators and performance metrics to help measure critical aspects of landscape sustainability status and trends. Guidelines, a verification mechanism and an online reporting platform have been developed or are underway. An optional 'Sustainable Landscape Partnerships' Module has been designed to help multi-stakeholder groups at any stage of their development to report their activities and progress in a structured manner in relation to five key elements of integrated landscape management.

For more information see: https://www.landscale.org/

Corporate commitments and company policy

With societal expectations and government demand for business to reduce harm and make a positive contribution to society and the environment on the rise, there has been renewed momentum around the concept of no harm and net positive (i.e. doing more good than harm or putting more back into society and the environment than you take out). 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 (Aiama et al., 2015).

Various supply chain actors have made sustainability commitments, including those that reduce their impact on biodiversity. The type of public commitments made varies by sectors but includes, for example, commitments to zero deforestation, no net loss or net positive impact, avoiding production in areas of critical habitat and HCVs, and complete avoidance of certain ecosystems (e.g. peatlands) or sites of high biodiversity and/or cultural value (e.g. UNESCO World Heritage Sites, Protected Areas, Key Biodiversity Areas etc.).

One of the highest profile corporate commitments in recent years has been the number of companies signing up to zero (net) deforestation commitments, notably among those with agricultural commodity supply chains. In a 2019 assessment of 865 companies within palm, soy, timber and pulp, and/or cattle commodity supply chains, 56% of these companies had made sustainability commitments (Rothrock et al., 2019). Some of the largest companies are leveraging considerable influence by integrating deforestation considerations into decision making on spending of multimillion-dollar procurement budgets (World Bank, 2019a).

While commitments are being made, progress in fulfilling zero net deforestation commitments varies considerably: from no action at all to those making tangible steps forward, including, for example, putting in place robust policies for sustainable sourcing of forest risk commodities, improving traceability of their commodities, and procuring certified sustainable commodities (Bregman et al., 2016). Of the 72 companies who made zero deforestation commitments, only 29% reported quantitative progress towards achieving the commitment (Rothrock et al., 2019). A Forest 500 assessment of the 350 most influential companies and financial institutions acting in the global palm oil, soy, cattle and timber supply chains, found that almost a third of commodity-specific forest-related commitments made by companies did not include any specific implementation actions (Corbett, 2019).

To date, the mining sector has yet to make such corporate-level commitments to reducing or halting deforestation (World Bank, 2019a), however relatively high numbers of mining and energy companies (compared to other sectors) have set “no net loss” or “net gain” goals, most including biodiversity though the detail and quality of these goals varies considerably (Rainey et al., 2015). Progress toward real outcomes for biodiversity on the ground has also been limited. Across sectors, company policy was also found to be a crucial driver in the decision for an operation to avoid particular impacts on biodiversity (Birdlife International et al., 2015).

Mitigating the adverse impacts of sector activities is essential, yet it is increasingly recognised that not only is there insufficient progress on the ground but that in fact ‘doing no harm’ is not enough. There is a growing focus on the role of business in making a positive contribution to society and the environment. This is being driven in part by the ambitious agendas of the SDGs and a growing urgency to deliver on climate and sustainability targets before it is too late. The need to move from policy and pledges to action and demonstrable outcomes has never been more pressing: policies and pledges are no longer accepted as a proxy for outcomes on the ground.

Uptake of net positive or net gain commitments has increased in recent years across a broadening range of sectors (e.g. communications, data management and Information Technology, property, retail, beverage packaging and marketing) (Uren et al., n.d.) and in reference to an array of environmental and social targets (e.g. elements of biodiversity, forest cover, fisheries, water quality and supply, land productive capacity, carbon, etc.). An active discourse around what net positive means for different sectors, targets and contexts is also ongoing (Net Positive Group, n.d.), though leading experts urge caution and consistency in the interpretation and application of net positive, emphasising the need for clear reference scenarios: i.e. net positive compared to what? (Maron et al., 2018).

Whilst uptake of net positive by agri-business and forestry has been limited to date, there is a growing recognition that long-term business success is tied to healthy communities and ecosystems[23] and some leading agri-business companies have stated their aspiration to achieve net positive (e.g. in reference to ecosystem services on which they depend) in future (FFI, 2018). Olam’s Living Landscapes Policy articulates the company’s ambition to achieve net positive outcomes for farmers, communities and ecosystems and sets out time-bound actions and commitments to achieve this (Box 7). As aspirations meet application, ensuring the longevity of positive contributions will be crucial, for example, by securing protection of habitats, inclusive participatory processes, strong community stakeholder involvement, public-private-people partnerships, and active monitoring.

BOX 7: OLAM'S LIVING LANDSCAPES POLICY

In 2018 Olam launched its Living Landscapes Policy. Through this Olam has committed to taking a net positive approach, whereby they aim to put back more into food and farming systems than they take out (e.g. net-positive landscapes and supply chains). Actions outlined to move toward this include 'maintaining or restoring healthy ecosystems' and 'enhancing local ecosystem services'. As is the case with certification standards, there is no systematic application of the mitigation hierarchy mentioned in Olam's policies, but elements of it (such as avoiding impacts), are used under their net positive approach. Although this is not a direct application of the mitigation hierarchy, it is a step in the same direction, with the approaches having similar conservation objectives at the core.

Olam reports on progress towards net positive against a set of indicators defined in the Living Landscapes Policy, with information accessible on an online platform for Olam customers. However, this does not appear the calculation of biodiversity and/or ecosystem losses and gains in order to verify progress towards a net positive impact. The Living Landscapes Policy is good step towards transparency and accountability for the environmental and social impacts of production within agricultural supply chains, but there is still space for progress to be made with tangible results demonstrated on the ground.

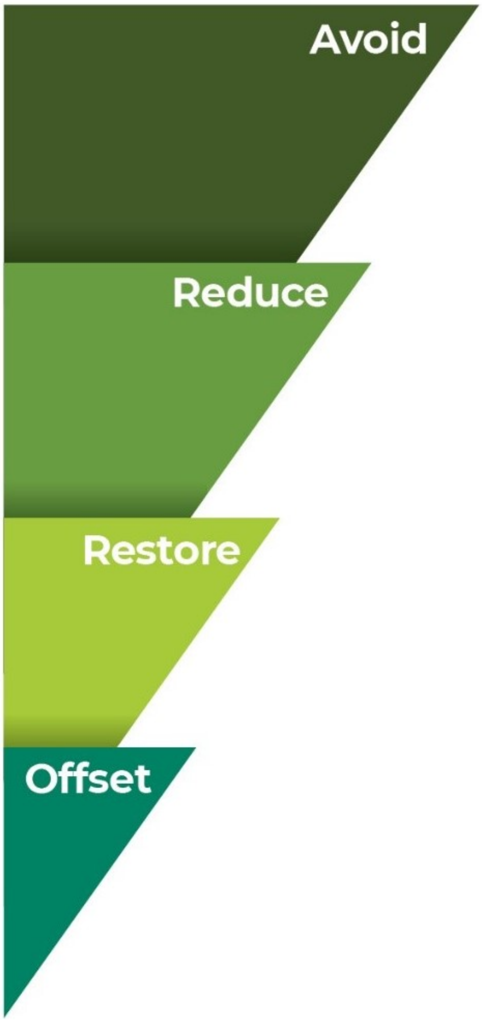
Crucially, Olam works with third party suppliers, including businesses and smallholders, to ensure that their operations conform to Olam's policies, including the Living Landscapes Policy and the net positive approach it takes. This decentralised dissemination is key to successful implementation and further development of the Living Landscapes Policy and similar policies and principles: mitigation is not a single decision made at a single location, it is the accumulated decisions of multiple actors over time and space.

ADDRESSING IMPACTS THROUGH A MITIGATION HIERARCHY

What is the mitigation hierarchy?

The mitigation hierarchy is a framework designed to help users prevent and limit the environmental harm through four prioritised steps involving the application of systematic measures to first **avoid** and then **reduce** or minimise adverse impacts i.e. preventing impacts to biodiversity and ecosystem services. Where impacts cannot be prevented, actions are taken to **restore** (reverse or remediate) impacts and as a last resort, **offsetting** may also be required to compensate for damages (IFC, 2012; The Biodiversity Consultancy, 2015). These steps may be applied sequentially, simultaneously or in series, and may require different levels of effort throughout the process.

The mitigation hierarchy is defined by the following steps:



Active measures that avoid the creation of an impact (e.g. arrangement of the project's footprint to avoid the conversion of natural habitat) or actively reduce the severity of an impact (e.g. re-routing of linear infrastructure to circumvent areas of important biodiversity and ecosystem services value) prior to the impact being realised;

Active measures that reduce the intensity (e.g. reducing operational lighting and noise volume), extent (e.g. implementing invasive species control measures), duration (e.g. controlling personnel access to sensitive sites) and exposure (e.g. fencing to prevent species accessing impact area) of impacts that cannot be avoided entirely;

Measures taken to actively remediate impacts to degraded or impaired biodiversity and ecosystem services (e.g. restoring degraded habitat on the project's footprint) or to facilitate passive remediation (e.g. removing barriers to connectivity to facilitate the dispersal of pollinators required for habitat regeneration) following the consideration of avoidance and minimisation measures;

Measures that compensate for significant residual impacts that cannot be prevented and remediated in the preceding avoidance, minimisation and restoration steps. Offsets are implemented to achieve a 'no net loss' or a 'net gain' outcome for biodiversity through physical actions and management of biodiversity that either improve or restore previous damage (e.g. habitat degradation caused by livestock grazing) or prevent or avert imminent or projected threats (e.g. unregulated harvesting of timber).

In practice, avoidance and minimisation actions serve to prevent impacts to biodiversity and ecosystem services, whereas restoration works to remediate remaining impacts and offsetting compensates for residual impacts. The mitigation hierarchy often needs to be applied iteratively to reduce as far as possible the residual negative impacts remaining after avoidance, minimisation and restoration measures.

Further to these steps, measures or actions that are not directly contributing to these mitigation steps or to addressing the impact can be implemented and are promoted as additional or proactive conservation actions. Such additional actions often work to complement the prevention, remediation and compensation actions of the mitigation hierarchy (e.g. improving policy that delivers equitable benefits delivered through the protection of biodiversity, contributing to research on biodiversity, ecosystem services and ecological function, implementing behaviour changing programmes to promote an indirect benefit to biodiversity through education).

The mitigation hierarchy provides a structure approach for achieving objectives of 'no net loss' or 'net gain' (or 'net positive impact') for specified environmental components, with the aim to counterbalance the negative impact of the development or to make a 'net' positive contribution. When applied as a hierarchy of steps and in an iterative and adaptive way, the application of the mitigation hierarchy will only require the use of offsets to compensate for residual negative impacts. To achieve no net loss and net gain through the use of impacts the following core principles (BBOP, 2012a, 2012b; Aiama et al., 2015) apply:

- Not all impacts can be offset; there are **limits** to offsets
- Biodiversity gains from offsets should be proven to be **additional**
- Gains should be **comparable** to the losses incurred by the project
- Gains should be **long-lasting** and sustainable.

The mitigation hierarchy is most utilised by developers and projects at the project-level to support the mitigation and management of environmental impacts and dependencies. It is widely accepted as an approach for managing impacts to the environment, particularly biodiversity and has been embedded in national policy, legislation and ESIA regulations, the environmental and social safeguards of lender banks, corporate policy and commitments, and sector standards. The mitigation hierarchy is well documented and good practice guidance and case studies demonstrating its application are available (Box 8).

BOX 8: GOOD PRACTICE GUIDANCE FOR APPLYING THE MITIGATION HIERARCHY

- Cross Sector Biodiversity Initiative. 2015. A cross-sector guide for implementing the Mitigation Hierarchy. CSBI.
- Business and Biodiversity Offsets Programme. 2012. Standard on Biodiversity Offsets. BBOP–Forest Trends.
- International Finance Corporation. 2012. Performance Standard 6: Biodiversity Conservation and Sustainable Management of Natural Resources. IFC.

A mitigation hierarchy approach is also increasingly being adopted in response to a range of landscape issues and targets, such as no net loss of biodiversity, Zero Deforestation and Land Degradation Neutrality. Whilst the potential for a global mitigation hierarchy framework for achieving no net loss or net positive for biodiversity, to be applied across all forms of human impact has been proposed with intended application from global to site scales and across all parts of society (Arlidge et al., 2018).

Benefits of effective application of the mitigation hierarchy at the project level include, for example:

- Reducing current and future risks, financial costs and delays to a project.
- Building a positive reputation of the project and corporate group, which may in turn open up access to diverse funding sources and new geographies.
- Managing impacts to the ecosystem services on which the operation depends (e.g. clean water sources may be required for irrigation and so the impacts of pollution of water through agrochemical run-off need to be mitigated). By applying the mitigation hierarchy to such impacts will help secure and maintain the integrity of the ecosystem service and the biodiversity and environmental variables that underpin it.
- By applying the mitigation hierarchy in full, a project can help secure and demonstrate its commitment to sustaining its social license to operate through reducing and managing the risks to biodiversity and ecosystem services and

integrating affected stakeholders requirements into their decision making processes and implementation of mitigation actions.

Challenges and opportunities for mitigation hierarchy application in complex landscapes

Variable uptake and application of the mitigation hierarchy within and across sectors

In complex multi-use landscapes, there will be different combinations of sectors and actors dependent on and impacting land, water and biodiversity, and the ecosystem functions and services it provides. The approach of each sector and operator to the prevention, mitigation and management of adverse impacts in the landscape varies considerably with implications for ecosystem health and resilience.

Whilst there has been considerable uptake of the mitigation hierarchy as a framework for alleviating environmental harm from development projects – including through policy and legislation, some major mining and oil and gas companies, and multilateral finance institutions – **mitigation hierarchy application on the ground continues to be inconsistent and patchy** both within and between sectors and across landscapes. Absence of in integrated land use plans, sectoral bias (due in part to the perception of non-applicability) have also limited the extent to which the mitigation hierarchy has been considered and applied across multiple sectors operating within a given landscape.

Although all steps of the mitigation hierarchy are applicable across most sectors, often there is **not a clear regulatory driver** for its application by all. For example: legal frameworks do not make explicit reference to the mitigation hierarchy or provide clear definition and requirements; are only applied to certain sectors or activities (e.g. smaller scale agricultural activities are unlikely to trigger EIA/ESIA requirements); legal requirements exist but are not enforced.

In such cases, the drivers for mitigation hierarchy application (and their respective strengths and weaknesses discussed above) will vary considerably among operators and sectors. This can create an **unlevel playing field with inconsistency in uptake and delivery** of impact mitigation across a landscape and over time leading to patchiness in application and increasing risks to short- and long-term outcomes for biodiversity. This can be a major disincentive for responsible operators and the influence of past, concurrent, and future operations can quickly undermine mitigation outcomes in the landscape (e.g. see World Bank, 2019b for case study examples in forest landscapes where mining is a dominant land use).

The **ability of different sectors and operators to apply mitigation hierarchy steps** also influences uptake and effective delivery (see also 'Poor application of avoidance across all sectors'). The type of commodity, scale of production and methods may all influence the feasibility of some steps of the mitigation hierarchy. Good governance, corporate commitment, capacity and financial resources available to invest in impact mitigation are also key. For example, in agriculture there is often more limited resources available (compared to large-scale extractives projects) to invest in impact mitigation due to the economics of production. Though as Aiama et al. (2015) point out, in some cases, fewer financial resources may be required given potential for more mitigation options being available to agriculture and forestry (e.g. for avoidance, use of ecologically degraded areas, and potentially more cost-efficient restoration).

Decision-making within agricultural production is also extremely decentralised. Production structures differ considerably depending upon crop, location and market. Even where centralisation appears to exist, such as in the production systems of large multinationals, a closer look reveals decentralisation at the source, with smallholders producing 70% of overall food production (Committee on World Food Security, 2016). This means that for each commodity, consideration of a scalable application of the mitigation hierarchy (or equivalent sustainability requirements), while it may be promoted and required by a corporate body, must occur at the individual level of hundreds of millions of independent and self-employed smallholders to be impactful. Understanding how to incentivise and support changes in practice at these varying scales will be crucial.

To date much of the **experience in applying the mitigation hierarchy has been in extractives and infrastructure** sectors. Uptake and internalisation of the mitigation hierarchy in other sectors, including those identified as major drivers of habitat clearance, degradation and biodiversity loss has been limited. For example, in forestry, agribusiness and agricultural landscapes more broadly, there is limited evidence of the systematic application of the mitigation hierarchy, quantification of residual impacts or measurable commitments to no net loss or net gain of biodiversity. Limited uptake of the mitigation hierarchy in agriculture and forestry partly reflects differences in the influence of regulatory drivers, the nature of impacts, involvement of more land managers, exposure to different scales, types and sources of finance and the influence of other voluntary standards (see 'Other drivers of better practice').

There are, however, **examples of mitigation measures** being applied to avoid, reduce and restore / rehabilitate environmental impacts in forestry and agriculture, often in fulfilment of the requirements of voluntary standards, albeit not applied in a hierarchical and systematic way (see 'Applying the steps of the mitigation hierarchy in agriculture and forestry'). Sustainable practices in forestry and agriculture, for example, involve promoting avoidance of areas of high conservation values and critical habitats, both in the landscape and on the concession. This represents opportunities. The contribution of sustainably managed plantations, for example, may enhance biodiversity and ecosystem services values when established on degraded lands while maintaining or restoring natural ecosystems in the surrounding landscape (WWF, 2012). Likewise, sustainably managed natural forest can be left to regenerate, which will have greater conservation benefit than conversion to intensive agriculture or being subject to a gradual process of degradation through unsustainable use. The assessment of residual impacts and use of biodiversity offsets to compensate for residual significant adverse impacts to achieve no net loss or net gain outcomes is not common in forestry or agriculture.

The concept of avoiding, reducing and repairing impacts, for example, is incorporated in Principle 6 of FSC: '*the Organisation shall maintain, conserve and/or restore ecosystem services and environmental values of the Management Unit, and shall* ***avoid, repair or mitigate negative*** *environmental impacts*' (Forest Stewardship Council, 2015). Similarly, the RSPO requires companies to meet a set of Principles and Criteria, in order to become certified. This includes Principle 7, 'Protect the environment, conserve biodiversity and ensure sustainable management of natural resources', under which plantations are required to meet a range of criteria to reduce their environmental impacts. This includes not clearing in HCV areas (Scott, 2017). RSPO's more recently introduced Remediation and Compensation Procedure does include requirements for onsite restoration and management (restoration) or offsite remediation (compensation).

Where multiple sectors and operators are driving environmental impacts, outcomes for species, ecosystems and ecosystem services at landscape scale will depend on all sectors committing to addressing their impacts.

Applying the steps of the mitigation hierarchy in agriculture and forestry

The early steps of the mitigation hierarchy are applicable in forestry and agriculture. Some examples are presented below as they relate to each sector and certain impacts.

Agriculture

- **Habitat clearance** and resultant biodiversity loss are major impacts associated with industrial scale agriculture and the cumulative effects of smallholder production. For large-scale agribusiness avoidance involves site selection to avoid areas important for biodiversity and/or ecosystem service values (e.g. HCV areas, areas of high carbon stock, key biodiversity areas, steep slopes, etc.). For smallholders and agroforestry, where there are typically more constraints on land use choices, avoidance may be achieved by avoiding thinning, not cutting down and burning forest habitat to make space for cultivation and retaining natural vegetation patches or buffers (e.g. along watercourses). For all scales of agriculture, the improvement and cultivation of ecologically degraded land presents a significant opportunity both to **avoid** impacts and help to **restore** soil health and productivity (Box 9). Maintaining areas of natural vegetation and removal of invasive species can support the process of rehabilitating or restoring areas after impacts (i.e. by facilitating natural regeneration). Incorporation of agroforestry systems on degraded agricultural land and designing agroforestry systems to include native tree species can play an important role in broader ecosystem restoration and biodiversity conservation efforts.

- **Agrochemical pollution** is a key concern in agriculture that can have harmful impacts on biodiversity, affecting aquatic organisms (when pesticides run-off into waterways), as well as species that provide important services such as pollination or natural pest control. To **avoid** these impacts in large-scale and smallholder agriculture chemical pesticides needs to be prevented. Impacts can be **minimised**, through the use of Integrated Pest Management (IPM); an approach to managing pests, diseases and weeds under which chemicals are the last resort. Preventative measures are used to reduce pest, weed and disease problems (e.g. crop diversification and rotation), and take advantage of natural biological control by encouraging natural enemies of pests (e.g. providing natural habitat within farms). If pest, disease or weed numbers reach a critical level, additional interventions can be used (e.g. biopesticides, trapping methods). Chemical pesticides are then used as a final option only where absolutely necessary.

- **Reduction in soil health:** for example, mono-cropping (growing the same crop year after year on the same land), depletes nutrients in the soil, can cause soil erosion, and necessitates the use of chemical fertilisers and pesticides. Mechanical tillage can exacerbate the issue by causing soil compaction and erosion. A range of practices can be used to **minimise** these negative impacts on soil:

- crop diversification (e.g. through intercropping multiple species on an area of land and rotating crops grown each season) to minimise nutrient depletion in soils.
- reduced or zero tillage systems to minimise soil disturbance and damage to soil structure, conserve soil organic matter, and reduce soil erosion (e.g. in large scale agricultural systems direct drilling offers a zero tillage alternative to ploughing).

A range of methods can be used to **restore** soil nutrients after impact (e.g. planting nitrogen fixing cover crops on land after harvest, and incorporating organic materials such as crop residues, manures and compost). These techniques replenish soil organic matter, nutrients, and improve soil's water holding capacity. By managing and potentially improving soil health, it also becomes easier to avoid or minimise the need to apply harmful chemical fertilisers.

- Agroforestry operations have potential to either negatively or positively **impact biodiversity**. Introducing agroforestry in existing forests requires the removal of native trees to meet specific shade requirements for the crop being produced, therefore negatively impacting biodiversity. However, site selection can be used to **avoid** areas of natural forest or vegetation and prioritise deforested or degraded areas for development. On degraded land, native trees can be replanted to provide shade for crops, while partially **restoring** or rehabilitating the land to a semi-natural state. Agroforestry systems can also be designed to **minimise** impacts on biodiversity, for example by using a high diversity of native tree species, enhancing structural and root diversity, and by ensuring trees are a mixture of ages. Compared to low diversity agroforests, this creates habitat that supports greater levels of biodiversity, enhances ecosystem services of pollination and pest control, and improves soil. Additionally, the footprint of agroforests can be designed according to dispersal needs of local non-forest specialist species, for example through connecting two isolated forest patches. See also Box 9.

Area-based offsets are unlikely to be appropriate for commercial agriculture involving large-scale clearance of natural habitat due to the sheer scale of compensation that would be required. There are however examples of agribusiness involvement in offsite conservation measures, for example through restoration of degraded lands or natural ecosystems, providing support to protected areas management or forestry authorities (logistical, financing), and providing funding to other agencies responsible for biodiversity conservation.

There is valuable experience in extractives and infrastructure sectors in applying the mitigation hierarchy that can be shared to the benefit of other sectors including agriculture. Yet there is also much to be learned from the approaches to managing complex sustainability challenges in other sectors. As a sector heavily dependent on access to land and the availability of ecosystem services, approaches to impact mitigation in agriculture often focus on enhancing ecosystem health and biodiversity in a way that supports agricultural productivity (Box 9).

BOX 9: EXAMPLES OF APPROACHES AND PRACTISES BEING APPLIED BY SOME AGRIBUSINESS AND SMALLHOLDERS TO MITIGATE AND MANAGE IMPACTS ON LAND, BIODIVERSITY AND ECOSYSTEM SERVICES AND TO PROMOTE MULTIPLE BENEFITS

Agroecology

Agroecology is a methodology based on applying ecological concepts and principles to optimize interactions between plants, animals, humans and the environment, within an agricultural system (FAO, 2018). The approach supports food production, food security and nutrition, while restoring ecosystem services and biodiversity. Instead of altering practices within unsustainable agricultural systems, agroecology transforms agricultural systems by addressing the root causes of problems in an integrated way, providing holistic solutions. Characteristics of agroecological systems include the diversification of crops, livestock, and native plants; improved nutrient recycling and resource use efficiency, for example through mulching or compost creation; building synergies in food systems to enhance food production and ecosystem services; and co-creation and sharing of locally relevant knowledge.

Agroforestry

Agroforestry refers to any land use system that incorporates trees with agricultural crops and/or animals, and as implementation can vary significantly, so too can the sustainability of the approach. Agroforestry can be used as a tool to improve the quality of an agricultural landscape, through integrating native and naturalised trees into farming systems. Agroforestry cannot offer habitat for forest specialist species, but can provide habitat for species that tolerate a certain level of disturbance, acting as corridors for species to move between forest patches (Jose, 2009). Agroforestry can provide a range of ecosystem services, including carbon sequestration, enhanced soil productivity and erosion control, improved water quality and availability, pollination, and biological pest control (FAO, 2017). In human-dominated landscapes, agroforestry has emerged as a key tool in creating and maintaining biodiversity islands and restoring degraded lands, though variations in structure and heterogeneity within agroforestry systems can affect biodiversity impact.

The Gorongosa Restoration Project has been working to restore Gorongosa National Park's rainforest ecosystem, in Mozambique. As part of this project, local people have been planting native trees on previously deforested plots within the park's buffer zone, to serve as shade trees for coffee agroforestry (Quammen, 2019). The project supplies farmers with training, tools, seeds, and a buyer for the harvested beans, to incentivise adoption by local people. This offers farmers the opportunity to shift away from unsustainable shifting cultivation practices, which lead to deforestation. The profits from Gorongosa coffee go towards community projects and conservation within the national park, supporting it to thrive in the long term.

Regenerative Agriculture

Agriculture can play a role in the restoration of degraded lands, for example through a regenerative agriculture approach. The regenerative approach consists of practices aimed at improving soil health or restoring highly degraded soils, by restoring soil's organic carbon. Practices under this approach include no-till agriculture, use of cover crops, intercropping, crop rotation, grazing management and elimination of bare soil. Benefits of regenerative agriculture include improved soil structure and soil health, soil fertility, and water retention (Rhodes, 2017).

Silvopastoral systems

Silvopastoral systems are agroforestry arrangements that integrate both fodder production and rotational grazing, aiming for the intensification of animal production based on the principles of agroecology. Silvopastoral systems promote and seek to leverage beneficial ecological interactions across the landscape. Examples of silvopastoral interventions generally reflect both intensity of tree cover and grazing management, ranging from trees scattered in a grazing landscape, to wood plantations that include grazing land, to intensively managed systems that combine rotational grazing with improvements to fodder diversity and feed additives (FAO, 2019).

Climate Smart Agriculture
Climate Smart Agriculture is an approach that helps farmers respond effectively to climate change. Its objectives are to increase productivity and incomes, adapt to climate change, and reduce greenhouse gas emissions (FAO, 2013). Climate Smart Agriculture includes an assessment of current and future climate change impacts, identification of adaptation strategies, and creation of an enabling environment for farmers. It includes the management of crops, livestock and ecosystems to conserve ecosystem services important for food security, agricultural development, adaptation and mitigation.

Conservation Agriculture
Conservation Agriculture is a methodology that comprises the practical application of three interlinked principles: reduced mechanical soil disturbance, often termed low-till or no-till; permanent soil organic cover using mulch and cover crops; and on-farm crop diversification. Like agroecology and Climate Smart Agriculture, Conservation Agriculture aims to leverage the benefits of ecosystem services without destroying them, and does so through a lens of soil biodiversity conservation. This in turn leads to improved soil texture, water retention and fertility.

Forestry

Examples to prevent and reduce the effects of forestry on **habitat alteration and biodiversity loss** from forestry in plantation and natural forest systems (World Bank Group, 2007) include:

- Leave trees or groups of trees in the harvest concession for regeneration purposes, and to provide food, nesting/denning sites, cover, and travel corridors for wildlife (avoid)
- Conserve and protect permanent seasonal habitat to ensure their use for migration, spawning, and rearing (avoid)
- Manage riparian zones to preserve water quality and wildlife habitat. Riparian zones should be connected with corridors of natural vegetation across watershed boundaries to allow for the movement of animals and plants (avoid / minimise)
- Allow canopy closure over roads to maintain habitat continuity (minimise)
- Schedule harvesting activities to avoid breeding and nesting seasons for any critically endangered or endangered wildlife species (minimise)
- Natural vegetation in the forest management area should be managed to ensure a variety of successional stages (minimise)
- Careful placement of access roads, skid trails, and log landings to avoid sensitive or high biodiversity areas and minimise impacts to soil and water resources (avoid / minimise)
- Modify logging practices (e.g. through selective logging, allowing longer timber harvest rotation times) to reduce impact, enable natural regeneration and support biodiversity (minimise / restore)
- Roadside strips should be left vegetated with natural cover (avoid / minimise)
- Natural vegetation should not be treated with pesticides (avoid)
- Forest operators should not intentionally introduce any new alien species (not currently established in the country or region) (avoid)

In plantation forests additional measures can be applied including, for example, promoting diversity in plantation stands (e.g. multi-age and multi-species, varying size and spatial distribution of blocks); avoiding and minimising the clearance of natural forest, other natural ecosystems and areas of biodiversity value – ensuring that known habitat of critically endangered or endangered species, or important wildlife breeding, feeding, and staging areas and other high conservation value or 'critical' habitat is avoided; set aside habitat important for biodiversity conservation and support its eventual restoration. Restoration will be especially important where forestry occurs in natural forests and/or contributes to natural forest clearance and where the land use after harvesting will be key.

No clear examples of offsetting were found in forestry. However, collaborative actions such as Asia Pacific Resources International Holdings Limited's (APRIL) Restorasi Ekosistem Riau (RER) programme are aimed at restoring ecosystem function of almost 150,000 ha of degraded peat swamp forest on the Kampar Peninsula and Padang Island are part of meeting APRIL's Sustainability Policy commitment to establish conservation areas equal in size to APRIL's plantation areas in recognition of their impacts.

Forestry, including both well managed forest and plantation operations, can be part of sustainable landscape solutions.

Poor application of avoidance across all sectors

Avoidance involves *"measures taken to anticipate and prevent adverse impacts on biodiversity before actions or decisions are taken that could lead to such impacts"* (The Biodiversity Consultancy, 2015). There are different types of impact avoidance, the most commonly applied being spatial avoidance (Box 10). Effective impact avoidance is vital to achieving not net loss or net gain goals and reducing business risk. Yet in practice, impact avoidance is often overlooked, misunderstood and poorly applied.

BOX 10: TYPES OF IMPACT AVOIDANCE

Spatial avoidance is often the most commonly applied type of avoidance and is where the location of planned development activity or infrastructure is altered or re-sited to avoid impacts on key biodiversity values. One issue with this form of avoidance is the potential for transference of impacts to other areas deemed to be of lower biodiversity value.

Temporal avoidance requires consideration of ecological components including breeding and migratory seasons. Temporal strategies may include restricting or halting particular development activities during a particular time period to avoid particular impacts for certain ecosystem functions (e.g. river flow) or a specific species (e.g. turtle nesting behaviour that can be disrupted by using floodlights during the nesting period).

Project design can be used to avoid impacts with, for example, the type and placement of infrastructure and its mode of operation. In Madagascar, for example, a nickel and cobalt mine used avoided impacts on terrestrial and coastal habitats by designing a pipeline around forest fragments and tunnelling below important waterways. In Yemen, the Materials Offloading Facility of an extractive development was re-designed to be in between two coral banks using a rock pile bridge to maintain ocean current flow and reduce the footprint of the infrastructure.

Source: Birdlife International et al. (2015)

Whilst provisions relevant to the mitigation hierarchy are often incorporated into policy and legislation through various tiers of government around the world (e.g. referring to 'avoiding' and 'mitigating' impacts, requirements for the rehabilitation of impacted areas etc.) **explicit reference to and definition of the mitigation hierarchy is often lacking** (UN Environment, 2018). Additionally, not all countries place a strong emphasis on carrying out avoidance. Where the mitigation hierarchy is supported or required it is frequently associated with EIA/ESIA regulatory frameworks. Thus, the wide-ranging issues with EIA/ESIA processes and their effectiveness in delivering impact mitigation at the project level underlie some of the challenges associated with the uptake and application of the mitigation hierarchy at the project level.

Particularly problematic for impact avoidance is the **timing of EIA/ESIA application which often happens too late for meaningful avoidance**, i.e. after decisions about land allocations have been made (i.e. areas in the landscape are pre-allocated to mining or oil and gas exploitation before proponents apply for a concession). The **absence of integrated land use planning processes and landscape level conservation plans** are a recurrent problem and thus the strategic avoidance of areas in the landscape important for particular components of biodiversity (e.g. threatened, rare or endemic species), for ecosystem function, and for the supply and flow of ecosystem services is rarely built into planning and decision-making processes. Overlapping land concessions that conflict with existing conservation areas, community forests, traditional land use rights and practises, culturally important areas, or with other economic activities are common.

Not all land uses, projects and activities not subject to impact assessment (i.e. through EIA/ESIA). This is particularly notable in the case of agriculture and forestry where activities under a certain size are not required to undertake an EIA/ESIA. Yet depending on the context may also apply to aquaculture, artisanal or small-scale mining, small-scale infrastructure projects, ecotourism etc. In such cases the regulatory driver for mitigating and managing and impacts may be lacking and there is not requirement to apply to apply the mitigation hierarchy.

Goals of **zero deforestation** emerging in recent years within the forestry and agriculture sectors focus on the avoidance end of the mitigation hierarchy but usually this is applied once a concession has been allocated already. For example, APRIL and its parent conglomerate, Royal Golden Eagle group committed in 2015 to 'no deforestation' to only develop areas that are not forested as identified with HCV and High Carbon Stock assessments.

Opportunities for avoidance vary within and between sectors influenced, for example, by criteria determining land suitability in different sectors or commodities and the type of production requirements, systems and practises involved. For example, in agriculture there is often greater flexibility in site location presenting more opportunities to a) avoid to sensitive natural ecosystems and landscape values restore and b) utilise marginalised or ecologically degraded land for production (acknowledging potential for significant investments to improve fertility and soil structure). In contrast, in extractive sectors, resource location puts spatial conditions on where development can occur, thus avoidance decisions are often challenged or set against unequal parameters resulting in trade-offs between economic, environmental and societal costs and benefits at the project and strategic national or sub-national scale. Sometimes, environmental or social impacts lose to economic benefits.

Other issues contributing to impact avoidance failures include[4]:

- **poor consideration of alternatives** at the outset of project planning - the 'no-go' option is rarely meaningfully considered.
- the timing of mitigation hierarchy application by development projects, which is often **applied retroactively** after impacts have occurred.
- challenges in **knowing what to avoid** (e.g. due to a lack of information and data and/or the absence of landscape level conservation and land use plans)
- **paucity of information** available to support the design and implementation of effective avoidance strategies.
- **inadequate understanding the complex and inter-related of development impacts** (direct, indirect and cumulative) and prioritising biodiversity values at an appropriate scale.
- avoidance strategies can be **costly**, may depend on **innovative** engineering, and **require impact assessment processes to take place prior to the design of a project**. Poor understanding of uncertainties and high costs of later stages of the mitigation hierarchy (restoration and offsets) compounds the problem.
- **biodiversity and ecosystem services not mainstreamed** in development processes or accepted as a driver in formal project design criteria resulting in a shift of costs/liability to later project stages such that **operations often rely heavily or entirely on restoration.**
- **complexity of no-net-loss requirements** and objectives and the need for untested solutions makes it difficult to argue for integration of biodiversity in decision-making.

Other challenges to improving mitigation outcomes in the landscape

Many of the issues discussed in the context of impact assessment processes (see 'Current approaches to development planning and impact assessment') are relevant when considering challenges and barriers to the effectiveness of impact mitigation. These include issues relating to:

- **absence of landscape-level land use and conservation plans**, is particularly problematic in ensuring effective avoidance of important biodiversity and ecosystem service values and for determining the available options for biodiversity offsetting
- the **failure to identify the full range of impacts** (particularly indirect and cumulative) arising from a project resultant mitigation plans, which typically focuses on addressing direct impacts, are inherently flawed
- failure to recognise **diverse threats and pressures** in the landscape can further undermine outcomes of mitigation action (e.g. where other threats to avoided or restored areas are not managed effectively)
- project-by project decision making and **piecemeal mitigation efforts** that fail to take the wider landscape context and other land users into account
- **siloed approaches** including the siloed treatment of social and environmental issues in some sectors (most notably in extractives and infrastructure but also evident in productive sectors) that fail to recognise dynamic and interdependent

[4] Draws on FFI's experience as well as reports from: Birdlife International et al., 2015; ICMM & IUCN, 2019; World Bank, 2019b.

socioecological systems, in turn limiting the assessment of impacts and mitigation options and contributing to heightened risk of unacceptable trade-offs and unintended consequences (e.g. through failures to recognise social implications of mitigation action and to understand the socioecological linkages in the landscape)

- **failure to mainstream biodiversity** and ecosystem services and poor attention to the ecological requirements for biodiversity and ecosystem services to persist and thrive
- **poor stakeholder engagement** affecting the feasibility and long-term effectiveness of implementation
- **lack of coordination** within and among sectors leading to missed opportunities, conflicts, and potential for mitigation measures to be undermined
- **poor collaboration** and communication amongst stakeholders including the state, businesses, local communities, academics, bilateral organisations, NGOs, and INGOs.

Other more specific limitations in mitigation hierarchy application relate to the setting of objectives which, if set at all, are typically at the project level and do not necessarily feed up into wider landscape or national level objectives or targets (where these exist). There is also a limited focus on residual impacts and recognised challenges (as highlighted by extractives operators with experience in applying the mitigation hierarchy) in measuring and monitoring biodiversity towards no net loss or net gain objectives. Notably, biodiversity is not often explicitly measured in the agricultural sector and the use of proxies such as forest cover and HCVs are more commonly applied.

Crucially, there remains a significant gap between mitigation plans and the delivery of tangible action and outcomes on the ground. Failure to avoid impacts in the first place, uncertainties and limitations to restoration and offsetting, and ineffective piecemeal mitigation efforts that are often applied too late result in irreversible impacts that are neither accounted for nor compensated.

Poor financial and legal mechanisms for delivery of mitigation and challenges in securing the necessary funds and resources exacerbate the problem. For industry operators, negligence or failure to manage risks relating to water, forests, primates and other unique and threatened species will have repercussions on project delivery: it can slow projects down, affect access to finance, cause conflict and controversy, cost money, and increasingly may stop projects altogether.

CONCLUSION: THE NEED FOR A MORE HOLISTIC, CROSS-SECTORAL APPROACH TO IMPACT MITIGATION ACROSS LANDSCAPES

In complex multi-use landscapes, operators need to understand and manage their impacts in the context of the wider landscape and dynamic socioecological systems. This requires individual industry operators to take an integrated, ecosystem-based approach and to look beyond the fence to consider their role and impacts alongside those of other land users, threats and pressures. However, project level efforts alone are not enough.

We have outlined above the utility, strengths, application and flaws of numerous approaches available to identify, assess, plan for, and manage environmental and social impacts in a landscape. Each approach is designed to deliver its own scope, scale and objectives and with varying degrees of uptake, application and enforcement. Each of the different approaches has merit, yet they are not always complementary to one another and are usually applied in isolation. Collectively these have largely failed to adequately incorporate biodiversity and ecosystem services, or to deliver an integrated approach to identifying and managing risks and impacts in complex landscapes.

Even when biodiversity is considered, the complexity of ecosystem patterns and processes and species' behaviours and ecology seldom form part of an impact assessment or design of mitigation measures. This has undermined their application and therefore has contributed to the continued decline in species, loss of ecosystem health and integrity, in turn leading to a loss of livelihoods, increased poverty, heightened health risks and unmitigated development.

Gillingham et al. (2016) call for *'revolutionary changes that will lead us towards more comprehensive, integrative, regional impact assessment'*.

Solutions that bridge divides across sectors and scales, and fully consider the cumulative effects of multiple developments and other threats and pressures on complex socioecological systems are needed. The CALM framework (FFI 2021) provides this integrated approach, building on all the existing approaches and providing extension and process that deals with complexity.

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