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Assessing biodiversity and cultural values for single-site and multi-property development proposals in northern Australia

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PREFACE

Northern Australia is the focus of intense development and investment interest. At the Commonwealth level alone, promotion of the northern Australia development agenda is facilitated by a dedicated Ministerial portfolio and departmental office, a road map for investment opportunities and policy reform ('White Paper on Developing Northern Australia'), a \$5 billion development financier (Northern Australia Infrastructure Facility), and tens of millions of dollars in research and innovation expenditure. The 'north' is being touted as a key to Australia's post-COVID economic recovery, particularly through the so-called 'gas-led recovery'. Yet, such ambition to unlock the economic potential of the north is not new. For all manner of reasons, impediments to development have historically limited the broadscale transformation (e.g., industrialisation) of the region's vast savannas, arid landscapes and extensive coastline.

As the spotlight once again bears down on northern Australia, it is timely to pause and reflect on the *status quo* of developing this region, and the challenges that remain unresolved. Central to this is the question: can development (resources, commercial agriculture etc.) be balanced with the ecological and cultural values of the region, and the aspirations of *all* of those who live there, and if so, how? Extending on this, what type of development, and where, is appropriate? Much has been written already, and numerous actors are operating in and contributing to this space. Indeed, this very topic is a central theme of a dedicated annual conference which attracts hundreds of delegates (*Developing Northern Australia Conference*). Yet, a consolidated picture of applicable policy frameworks and major decision-making protocols that characterise the development 'ecosystem' of the north is lacking. Clarifying this picture matters because the north is different. It is a region of extremes and of contradictions – extraordinary ecological value that is superficially intact yet imperilled, a resplendent human history juxtaposed against conflicting development aspirations, and vast areas untouched by infrastructure but for which the fingerprints of humanity are everywhere. The way in which planning is done, decisions are made, and impacts are managed, must all be fit-for-purpose for the unique circumstance of the north.

This report aims to start 'connecting the dots'. With a focus on the Northern Territory (although much will be applicable to northern Queensland and northern Western Australia), we describe and contextualise the decision-making environment around new development, especially as this relates to the management of ecological (and linked cultural) impacts. Our intention is that this piece of work will start to clarify some of the key challenges that potentially represent an impediment to sustainable development in the Northern Territory (and across northern Australia). These challenges include how to address the cumulative impacts of multiple development projects, how to assess and manage impacts at multiple spatial scales, and how/when Indigenous custodians can lead and guide decision-making, especially so as to provide opportunities for aspirations for development on Country to be realised. This exercise will not necessarily provide the *answers*; it will, however, outline a clearer picture of the development decision-making space, and illuminate the key *questions* that remain to be asked and addressed, before truly sustainable development of this region can proceed.

INTRODUCTION

Broadly, there are two ways in which the impacts to biodiversity from new developments (e.g., mines, infrastructure) are planned for, assessed, and managed: projects are either considered individually, or multiple projects within a defined space are planned/assessed simultaneously. The individual ‘project-by-project’ approach, which has increasingly come to be underpinned by the mitigation hierarchy (sequentially: avoid, minimise, rehabilitate, and offset impacts), has dominated the impact assessment (IA) space for decades (Kiesecker et al. 2010; Tallis et al. 2015; Brownlie and Treweek 2018; Heiner et al. 2019a; Gutierrez et al. 2021). However, a major problem with assessing and managing projects in this way is that the impacts of individual projects, which in isolation may be inconsequential (from a regulatory perspective), often accumulate across multiple projects and scales with potentially severe implications for biodiversity (Connelly 2011; Whitehead et al. 2017; Roudgarmi 2018; Durning and Broderick 2019; Environmental Protection Agency 2020).

Planning for and assessing multiple projects across a broad spatial scale simultaneously is viewed as a solution to addressing the problem of so-called cumulative impacts on biodiversity (Cole and Broderick 2007; Therivel and Ross 2007; Franks et al. 2010a; Franks et al. 2010b; Johnson et al. 2011; Tetlow and Hanusch 2012; White and Noble 2013; Burton et al. 2014; Bidstrup et al. 2016; Athayde et al. 2019; Environmental Protection Agency 2020). Other (theoretical) benefits of taking a ‘strategic’ or landscape-/seascape-/regional-level planning approach to managing future development include greater efficiency and certainty for developers and their backers (Franks et al. 2010a; Franks et al. 2010b; Groom et al. 2018), and opportunities for broad-scale spatially explicit mitigation (and proactive conservation) that is better able to achieve desirable outcomes (e.g., setting aside ‘no-go’ areas that must be avoided; aggregating biodiversity offsets to account for landscape-level ecological factors such as habitat connectivity) (Kiesecker et al. 2010; Kujala et al. 2015; Brownlie and Treweek 2018). However, despite the promise of improved outcomes from ‘strategic assessment’ (e.g., assessment, and sometimes approval, of multiple projects in a defined space), and associated protocols like regional planning (e.g., spatial analysis of future landscape scenarios to guide decision-making), these approaches continue to be underutilised in IA (Bidstrup et al. 2016; Foley et al. 2017).

The ongoing predominance of project-level IA, and its potential contribution to unmanaged cumulative impacts, underscore the push in the policy and scientific discourse towards much greater uptake and implementation of strategic assessments and regional planning (Cole and Broderick 2007; Connelly 2011; Johnson et al. 2011; Noble et al. 2017; Whitehead et al. 2017; Heiner et al. 2019a; Samuel 2020). And yet, fundamental questions about strategic/regional approaches – namely, their ability to resolve cumulative impacts while not adversely affecting the ability of people to connect with and derive services from nature – remain unanswered (Victorian Auditor-General's Office 2020; Gutierrez et al. 2021). Severing people-nature connections is a major risk of development projects, and is brought into sharp focus where Indigenous people have long-standing and ongoing connection to and custodianship of nature. It is thus crucial that we critically appraise both the opportunities *and* risks of taking a strategic/regional approach to planning and IA, lest these approaches do more harm than good (*vis-à-vis* project-level IA) to nature *and* people.

In this report, we explore the overarching research question: *at what spatial scale, and within what broader framing, should IA be conducted in northern Australia?* Considering the cultural, biodiversity and development context of one jurisdiction – the Northern Territory – and focussing specifically on the impacts of development on biodiversity and biocultural values, we describe the potential limitations of project-level IA and compare these to strategic assessment/regional planning approaches. Noting that (1) Indigenous peoples’ lands and waters cover much of the Earth, including

many areas under imminent development pressure (Garnett et al. 2018; Fa et al. 2020); and (2) there is an increasing intersection between western and Indigenous biodiversity values in IA (e.g., through tools like biodiversity offsetting (Bull et al. 2018; Griffiths et al. 2019; Jones et al. 2019; Griffiths et al. 2020); ecosystem service delivery (Walton and Fitzsimons 2015)), the questions we pose are both timely to address. Moreover, they are of relevance not just in the Northern Territory, but across northern Australia and indeed many parts of Earth.

We consider two sub-questions to address our overarching research question. The first sub-question we consider is: *does taking a spatially strategic (multi-scale) approach to IA help alleviate the problems of project-by-project assessments, and especially, cumulative impacts?* Focussing on a key threat to biodiversity – vegetation (habitat) removal – strategic approaches are potentially useful for those ecosystems/species which can be lost and gained across a broad landscape through approaches like biodiversity offsetting so long as a desirable net outcome (e.g., no net loss of that biota) is achieved (Kiesecker et al. 2010; Kujala et al. 2015; Brownlie and Treweek 2018). However, the spatial ‘rearrangement’ of species/ecosystems of cultural significance across a landscape may be unacceptable to Indigenous rightsholders and custodians whose connection to those biota has been variously altered or disrupted (Lawe et al. 2005; Spyce et al. 2012; Mantyka-Pringle et al. 2017; Griffiths et al. 2020; Proverbs and Lantz 2020). We explore these themes in **Part 1** of this report.

While the first sub-question is one of scale, the second is one of context: *to what broader objectives (such as biodiversity conservation targets) are or could strategic assessments/regional plans contribute to?* Some approaches to regional planning are framed by the achievement of specific/defined conservation targets (Heiner et al. 2019a). However, the prevailing approaches to IA in Australia and abroad – especially how losses (from development) are managed via the mitigation hierarchy – may render strategic assessments decidedly ‘unstrategic’ where their outcomes are misaligned with or not directly linked to the achievement of broader (e.g., jurisdictional, or global) biodiversity conservation targets (Runhaar and Driessen 2007; Noble 2008; Gunn and Noble 2011; Hegmann and Yarranton 2011; Bidstrup and Hansen 2014; Bull et al. 2018; Simmonds et al. 2020; Gutierrez et al. 2021; Maron et al. 2021). The potential for adverse outcomes such as the unmanaged drawdown of habitat/species populations to be amplified across a broader space warrants particular attention in strategic/regional approaches, especially where these efforts are purported to address key flaws of project-level assessments (e.g., cumulative impacts). We examine how IA outcomes (project-level or strategic) can be linked to the achievement of biodiversity targets in **Part 2** of this report.

Northern Australia is an ideal case study for conducting a conceptual investigation of the role of strategic/regional IA approaches, and how issues of scale and context might affect their outcomes. This relatively undeveloped and biodiversity-rich part of Australia is the focus of substantial investment interest and numerous development proposals, including vast resource extraction projects to power the nation’s post-COVID economic recovery (Australian Government 2015; Prime Minister of Australia 2021). It has been, and remains, subject to various land-use planning endeavours, which have significant potential to inform IA (Charles Darwin University 2015; Adams et al. 2016; Morán-Ordóñez et al. 2017; Northern Territory Government 2021). Of particular note is the extraordinary human history and long-standing connection to and custodianship of Country by Indigenous Australians in northern Australia – and the precedence with which the aspirations of rights holders must be considered in any planning or decision-making rather than a reliance on ‘trickle-down economics’ flowing from activities proposed by others (a statement that applies across the entirety of Australia) (Russell-Smith et al. 2019; Samuel 2020). In the context of recommended changes to Australian IA law, not least of which include (1) an increased uptake of regional planning

and strategic assessment, and (2) fundamental changes to the management of Cultural Heritage and biodiversity, it is timely to examine how different approaches to IA can contribute to (or detract from) sustainable development in northern Australia (Samuel 2020).

By examining these questions in this report, we suggest that current approaches to broad-scale development planning and assessment may be incompatible with conserving elements of the biota (species, ecosystems, ecological processes) that are of value to Indigenous custodians. We conclude that the management of biodiversity in IA in places like the Northern Territory, where species and ecosystems have recognised western *and* Indigenous value, must be viewed as a multi-scale endeavour. Ideally, decision-making across these multiple scales needs to (1) be harmonized, to ensure that the right people are proactively involved in planning and decisions at the right scale and at the right time, and (2) be nested within an overarching objective (set of goals/targets) for biodiversity and Cultural Heritage, such as those likely to be enshrined in the Post-2020 Global Biodiversity Framework under the United Nations Convention on Biological Diversity (Secretariat of the Convention on Biological Diversity 2020). We specify how existing frameworks and approaches might be built upon and linked together to help ensure IA accounts for the various, multi-scale values of biodiversity. The recommendations we present, and the future research priorities we highlight, are applicable to both northern Australia, and to numerous other regions around the world where Indigenous custodianship of land, sea and biodiversity intersects with development interests.

PART 1: HABITAT LOSS, CUMULATIVE IMPACTS AND ASSESSMENT AT DIFFERENT SPATIAL SCALES

In this part of the report, we present a brief review of the concept of cumulative impacts. The rationale for this review is that:

- (1) there is a need to find ways to avoid cumulative impacts in ongoing and future development decision-making in northern Australia, necessitating an examination of *why* impacts accumulate in the first place; and
- (2) unintended consequences *may* arise from taking a strategic approach to addressing cumulative impacts, and these need to be identified and managed.

In critiquing the concept of cumulative impacts in the context of development in northern Australia, we focus on the impacts of vegetation clearing and habitat loss for biodiversity (rather than other unmitigated impacts which may accumulate in time and space such as pollutant loads, or mortality during a project's operational phase). We note that this represents a narrow lens of the full spectrum of values of place and Country, but we retain a focus on species and ecosystems here as these are the 'units' which underpin existing IA paradigms. Noting this, we examine these issues using Australia's key national environmental legislation, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), because it provides a representative illustration of a regulatory framework encompassing a multi-scale approach to assessing and managing development activities on species and ecosystems.

1.1: What are cumulative impacts?

Cumulative impacts are variously defined, both in the international literature, and among jurisdictional IA policy instruments. Indeed, there is no overarching accepted definition of cumulative impacts (or cumulative 'effects' as they are interchangeably referred to as) (Gunn and Noble 2011; Durning and Broderick 2019). Cumulative impacts can be broadly described as incremental actions (past, present and future) that stem from both human activities (development projects; unregulated actions) and natural processes (e.g. disturbances caused by weather, seismic activity) that effect change on environmental and social processes across a space (Ma et al. 2009; Franks et al. 2010a; Franks et al. 2010b; Connelly 2011; Franks et al. 2013; International Finance Corporation 2013; Renewable UK 2013; Bailey et al. 2014; Bidstrup et al. 2016; Jones 2016; Noble et al. 2017; Durning and Broderick 2019; Proverbs and Lantz 2020; Samuel 2020). By their very nature, cumulative impacts are considered in aggregate; impacts which are deemed insignificant individually may become consequential when combined in time and space (Connelly 2011; Roudgarmi 2018; Durning and Broderick 2019; Environmental Protection Agency 2020). What constitutes a 'significant' or 'consequential' impact, be it emanating from a single action, or the aggregate of multiple actions, is a matter of both (heterogeneous) human value sets, but more pragmatically, an issue of the scope and intent of policies that regulate land use/cover change (see **section 1.4**, below).

There are two main ways in which impacts from individual projects (and other unregulated or historical activities) accumulate: 'additively' or 'synergistically'. Additive impacts are defined as the sum of individual effects (e.g. arising from individual projects) to give a 'total impact' (alternatively, the magnitude of the combined impacts) (International Finance Corporation 2013; Minerals Council of Australia 2015; Foley et al. 2017; Roudgarmi 2018; Athayde et al. 2019; Environmental Protection Agency 2020). By contrast, synergistic impacts are those where the combined impact is *greater* than the sum of the individual impacts (sometimes referred to as 'compounding' effects) (International Finance Corporation 2013; Minerals Council of Australia 2015; Foley et al. 2017; Roudgarmi 2018;

Athayde et al. 2019; Environmental Protection Agency 2020). A third process is also recognised, termed ‘antagonistic’ cumulative impacts (interchangeably referred to as ‘neutralising’). Antagonistic impacts are those individual effects that counteract or neutralise each other, or where the total impact is *less* than the sum of all impacts (International Finance Corporation 2013; Minerals Council of Australia 2015; Foley et al. 2017; Whitehead et al. 2017; Environmental Protection Agency 2020). However, unlike additive and synergistic impacts, antagonistic impacts are often neglected in the various working definitions of cumulative impacts.

1.2: Why are cumulative impacts important?

Cumulative impacts arising from development contribute to ongoing biodiversity declines and the degradation/loss of ecosystem services, thereby undermining sustainability endeavours (e.g., the United Nations Sustainable Development Goals (UN SDGs)). Numerous policy frameworks around the world (e.g., government regulations, financier requirements) establish benchmarks for the outcomes of development – frequently, ‘no net loss’ of biodiversity. However, for various reasons, this goal is rarely achieved or is unattainable (zu Ermgassen et al. 2019; Samuel 2020; Sonter et al. 2020b) (**Figure 1**). This means that adverse impacts from new development result in net losses, which can exacerbate impacts in a landscape that are a result of past activities (e.g., vegetation clearing), as well as those due to unmanageable, unregulated or illegal contemporaneous actions (**Box 1**).

The contribution of development projects to the ongoing loss of biodiversity is not only misaligned with the stated objectives of many policy frameworks that regulate (approve) projects (i.e., no net loss), but it is also inconsistent with agreed-upon commitments of nations to stem biodiversity loss. Such commitments, made under the UN Convention on Biological Diversity (CBD) and the SDGs, make clear statements about arresting declines of species’ populations and ecosystem extent/condition. Indeed, the draft Post-2020 Global Biodiversity Framework under the CBD proposes ambitious commitments for net gains in ecosystems, and maintenance and improvement of species populations (Secretariat of the Convention on Biological Diversity 2020). Losses from development projects that go unmanaged and subsequently accumulate in a landscape risk undermining these ambitious and vital goals.

Box 1. Cumulative impacts and the decline of a threatened bird in northern Australia

The southern black-throated finch (*Poephila cincta cincta*) is a clear example of a (sub-) species that has been affected by cumulative impacts from development projects. Vegetation removal undertaken for agriculture and development activities has caused extensive habitat loss for the southern black-throated finch, which has suffered severe population declines and a large range contraction in recent decades (Vanderduys et al. 2016; Reside et al. 2019). It has been protected under Australian law for over 20 years, and yet its conservation status remains precarious.

Upon commencement of Australia's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) this species was listed as Vulnerable. While a listed Vulnerable species, there were 177 development projects proposed that overlapped/impacted potential southern black-throated finch habitat (Reside et al. 2019; Simmonds et al. 2019). All of these projects were permitted to proceed under the EPBC Act, with only a subset of projects triggering rigorous assessment of their impacts (Simmonds et al. 2019). The subspecies was subsequently up-listed to Endangered in 2004 affording it a higher legal protection (Reside et al. 2019; Simmonds et al. 2019). However, this bird's habitat has continued to be lost, often under the purview of the EPBC Act regulatory system (Reside et al. 2019; Ward et al. 2019). Indeed, since 2000, 631,000 ha of woodland within the range of the southern black-throated finch has been removed (Reside et al. 2019). This, on top of a 51% reduction in historical habitat before 2000. The accumulation of losses – including since 2000 from dozens of projects that were deemed to not have a 'significant' impact on this bird, or from approved projects where management is likely insufficient to produce gains (e.g., offsets) to counterbalance losses – further imperil a taxon that is already threatened by a legacy of vegetation clearing and pervasive habitat degradation. In this regard, the southern black-throated finch is a classic case of a species suffering from 'death by a thousand cuts' – an accumulation of multiple losses (Therivel and Ross 2007; Vanderduys et al. 2016; Whitehead et al. 2017; Roudgarmi 2018; Mokany et al. 2019; Reside et al. 2019; Simmonds et al. 2019; Ward et al. 2019).

1.3: How are cumulative impacts assessed?

Impact assessment (IA) is the prevailing framework for the sustainable management of new development projects. At its core is environmental impact assessment (EIA) – a well-established protocol for examining the impacts of an individual project against regulated (government, corporate) assessment criteria. EIA is recognised in a large number of international policies, practiced in many countries around the world (Morgan 2012), and is a requirement across Australian states and territories, as well as under the Commonwealth EPBC Act. Increasingly, EIA is conducted in accordance with the mitigation hierarchy – sequentially, 'avoid, minimise, rehabilitate and offset' impacts arising from a proposed development.

Despite its ubiquity in policy around the world, and the unifying framing of the mitigation hierarchy, project-level (E)IA is frequently criticised for its failure to adequately address development impacts on biodiversity (Connelly 2011; Whitehead et al. 2017; Roudgarmi 2018; Durning and Broderick 2019; Environmental Protection Agency 2020). Central to this is the notion that project-level IA takes too narrow a focus on the activities of a single actor at a single site (e.g. the proposed development), thereby neglecting how impacts from a project may accumulate beyond a project to affect the biota (and people, see **Section 1.4**, below) in the broader landscape.

A range of approaches have been enacted in policy to broaden the scope of IA, with the specific objective of addressing cumulative impacts (**Table 1; Box 2**). For example, in Canada, dedicated approaches for cumulative impact assessment have been incorporated into project-level IA.

However, upon critical review of EIA processes and their implementation in Canada, attempts to account for cumulative impacts while retaining a single project assessment focus have been found to be limited in their effectiveness, primarily due to a lack of understanding of the role of EIA for guiding decision-making (Noble 2009; Johnson et al. 2011; Noble et al. 2017). A potential solution to broaden the scope of IA and better address cumulative impacts is to integrate the principles of (project-level) CIA within a regional/strategic approach. This would complement existing EIA frameworks rather than substitute them, to address cumulative impacts more holistically (i.e. across dynamic landscapes) as opposed to solely relying on project-based approaches (Noble 2008; Johnson et al. 2011).

This move towards strategic assessments is also advocated in Australia: the 2020 independent review of the EPBC Act recommended that strategic assessment plans should be developed and implemented to support more effective planning that accounts for cumulative impacts and future key threats (Samuel 2020). This would not require a change in Australian law – strategic assessment is embedded in the EPBC Act, with 25 such assessments having been initiated or endorsed since 2008. Rather, this recommendation points towards the greater use of strategic assessment, where this use is framed by a regional planning process (Samuel, 2020).

Table 1. Various approaches to addressing cumulative impacts are embedded in policy and/or advocated for in the literature. Much like the term ‘cumulative impacts’, the protocols listed below are prone to ambiguity and inconsistency in their definitions. Here, we highlight examples of definitions of these approaches, as captured in IA policy/discourse – we note that some definitions are generic, while others are from specific regulatory instruments where they have a particular intent and application. Broadly speaking, cumulative impact assessment/cumulative effects assessment are linked to project-level IA, which frame the dedicated assessment of impacts beyond the immediate footprint of an individual action. In Australia, terms of reference for major projects, assessed using project-level IA, often require a dedicated analysis of cumulative impacts, under the badging of a cumulative impact assessment. Conversely, strategic environmental assessment/strategic assessment move beyond individual projects to take a regional or landscape-level approach, with a remit that extends to multiple proposed actions/developments. Strategic approaches can provide guidance on future decision making (e.g., siting and management of actions), or can entail a full IA process whereby impacts are examined (e.g., using the mitigation hierarchy), and approved to proceed. Australian law (the EPBC Act) has provisions for strategic assessment, where multiple proposed actions can be considered simultaneously.

Protocol	Definition
Cumulative impact assessment	<ul style="list-style-type: none"> • CIA is the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen ‘valued environmental and social components’ over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible (International Finance Corporation 2013). • Cumulative impact assessment (CIA) is an approach to environmental impact assessment (EIA) that aims to consider the effects of multiple actions or impacts on the environment (Minerals Council of Australia 2015).
Cumulative effects assessment	<ul style="list-style-type: none"> • Cumulative effects assessment (CEA) involves an assessment of the impacts of the proposed project on valued components of the environment, in combination with the impacts of other activities in the project’s environment that have been or will be carried out (Noble et al. 2017). • The cumulative effects assessment (CEA) is a regulatory requirement of the EIA and needs to document predicted changes to the environment that might be reasonably anticipated from a proposed activity in combination with other activities (Franks et al. 2010a).
Strategic environmental assessment	<ul style="list-style-type: none"> • Strategic Environmental Assessment (SEA) is an impact assessment tool that is strategic in nature and has the objective of facilitating environmental integration and the assessment of the opportunities and risks of strategic actions in a sustainable development framework (Partidario 2007). • SEA 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 (International Association for Impact Assessment 2020).
Strategic assessment	<ul style="list-style-type: none"> • Strategic assessments are assessments done at the scale of a policy, plan or program, while regional assessments may be at the scale of a minerals or resource province, catchment, or political jurisdiction (Franks et al. 2010a). • Strategic assessments are landscape scale assessments and unlike project-by-project assessments, which look at individual actions (such as construction and operation of a pipeline or wind farm), they can consider a much broader set of actions. For example, a large urban growth area that will be developed over many years, or a fire management policy across a broad landscape (Australian Government 2021).

Box 2. Cumulative impact assessment and strategic assessment in Australia – critique of application

Cumulative impact assessment – Groom et al. 2018

Groom et al. (2018) examined the performance of the EIA process, complemented by a dedicated cumulative impact assessment (CIA), as it applied to three adjacent project footprints with multiple accumulating impacts on marine megafauna. These projects involved port construction/expansion within the Great Barrier Reef World Heritage Area. The objective of a CIA is to assess the actual and potential impacts of multiple projects/development activities that may interact over time and/or space (Groom et al., 2018). Each of the three case study projects were expected to variously impact marine megafauna, and so slightly different assessment tools were used in each study. Groom et al.'s key finding was that despite the different assessment methods used for each project, a common theme across all three case studies was insufficient environmental data available to describe the values of the development areas and the seascape in which their respective impacts would accumulate. This hampered a comprehensive description of the cumulative impacts arising from the three projects, thereby constraining the development of robust management plans and offset programs (Groom et al., 2018). Without this comprehensive understanding of the broader environmental context, EIA/CIA processes may not meet their objective by failing to adequately capture the impacts of multiple projects and hence result in undetected/unmanaged impacts to species. The key recommendation of this paper is that governments should (1) integrate strategic assessments and CIA processes, and (2) apply site-specific CIA guidelines to increase effective engagement in EIA processes (Groom et al., 2018).

Strategic assessment – Gutierrez et al. 2021

Under the Australian EPBC Act, strategic assessment's purpose is to measure, assess and inform management of the impacts of a plan, policy or program (and associated actions) on matters of national environmental significance (MNES). However, the extent to which strategic assessment can/does account for how impacts to ecosystems and species affect people (e.g., by affecting ecosystem services) is less well understood. Gutierrez et al. examined documentation relating to six strategic assessments conducted for regional-scale urban development plans and programs in Australia. They undertook qualitative and quantitative analyses on keywords that appeared in the strategic assessment reports; specifically, any mention of biodiversity, ecosystem services, and the context these words appeared in (i.e., if they fulfilled criteria set by the International Best Practice Principles on Biodiversity and Ecosystem Services in Impact Assessment). The study found that under half of the criteria assessed were fulfilled in all case studies; the term 'biodiversity' appeared in all case studies, but 'ecosystem services' were scarcely mentioned. The implication of this result for strategic assessment is that in its current form, it is failing to account for regional implications of changes to the supply and flow of the services that nature provides people – thus, there is a need for greater integration of biodiversity and ecosystem services in strategic assessment. Gutierrez et al. (2021) recommended that further integration of biodiversity and ecosystem services in strategic assessment can be achieved through “specifying the reference or counterfactual scenarios against which no net loss and net gain goals are determined, improving the integration and analysis of ecosystem services, providing more evidence to demonstrate the application of all steps of the mitigation hierarchy, and including more detailed information on biodiversity management systems and follow-up activities prior to decision-making.”

Despite the long-standing predominance of IA frameworks, ongoing losses of biodiversity due to development continue to occur. Unmitigated cumulative impacts, such as those that have precipitated the decline of the southern black-throated finch (**Box 1**), and likely other threatened Australian species (Cristescu et al. 2019; Simmonds et al. 2019; Dyer and Simmonds 2021), are a major impediment to halting and reversing biodiversity declines. While formalised examination of cumulative impacts in project-level IA is happening sporadically in Australia (**Box 2**), a more systematic move away from project-by-project assessments towards a landscape-scale or regional-

scale approach is widely advocated as the key way in which to minimise cumulative impacts (Noble 2008; Johnson et al. 2011; Noble et al. 2017; Noble and Nwanekezie 2017; Whitehead et al. 2017; Samuel 2020; Gutierrez et al. 2021).

1.4: Multi-scale assessment of development in northern Australia

The footprint of commercial and industrialised development is increasingly spreading in northern Australia, not least because of the vast natural resource reserves in the region. This is likely to expand further because of the region's potential for (as yet unrealised) upscaled economic output across various other sectors (Australian Government 2015). This coincides with the increasing recognition of, and indeed, strong calls for, IA in Australia to evolve from project-by-project assessments to a regional/landscape perspective where numerous proposed actions are planned for and assessed in a consolidated manner (Whitehead et al. 2017; Groom et al. 2018; Samuel 2020).

On face value, northern Australia lends itself well to this shift towards strategic approaches. Its structurally intact landscapes and diversity of conservation-significant species may be particularly susceptible to cumulative impacts arising from developments. This is because disturbance may facilitate new threats (e.g., due to unforeseen effects of landscape fragmentation) or exacerbate pervasive degrading processes. Further, relatively small, isolated losses may be considered inconsequential across a largely intact region, where these are considered through a myopic case-by-case lens. Thus, taking a strategic approach, where multiple impacts are considered in tandem, and are examined in the context of (environmentally and culturally) dynamic landscapes potentially makes a lot of sense in the north.

However, an *uncritical* jump from project-level IA to a strategic (landscape/regional) assessment approach in northern Australia warrants scrutiny. Strategic assessments under the Commonwealth EPBC Act have returned mixed outcomes to date (**Box 2**). The extent to which approaches like the strategic assessment framework under the EPBC Act are fit-for-purpose in regions where biota is variously valued (western-scientific framing; Indigenous biocultural value), and where approaches for managing biodiversity losses and gains (e.g., offsetting) remain subject to ongoing critique and refinement, underscores the need to take a critical lens to the potential efficacy and risk of unintended outcomes of strategic assessments.

In order to manage cumulative impacts, we need to understand why impacts (e.g., habitat loss) occur and thus accumulate in the first place. Focusing on northern Australia, and the general principles of IA that are applicable to this region under Australia's EPBC Act, below and in **Figure 1** we step through three key reasons why impacts may accumulate from individual projects. For illustrative purposes, we focus here on the removal of native vegetation and the habitat it provides, but similar logic applies to other types of impacts as well. We then summarise the benefits and risks of undertaking strategic assessments in this region in **Figure 2**.

Reason 1: many impacts are out of scope

A key, and oft-neglected, reason why impacts go unmanaged from individual projects, and thus accumulate across multiple developments, is that they are simply not required to be considered in IA. These are the 'out of scope' losses – impacts arising from a development that affect elements of the biota (species, ecosystems, ecological processes) that are not triggers for assessment. In other words, this means that losses to these biota do not have a bearing on whether a project is approved to proceed. In an EPBC Act framing, this includes biota that are not a 'matter of national environmental significance' (MNES), comprising species and ecosystems that are not considered to be of conservation significance (i.e., common and/or abundant species; widespread ecosystems).

While these biota may benefit incidentally or indirectly from the assessment and management of MNES, their loss is not explicitly addressed/managed in project-level assessments.

Where widespread vegetation removal has occurred/is occurring across a region, ongoing losses for out-of-scope biota may pose a major threat to their function or persistence. This is the case in south-east Australia, where whole assemblages comprising ‘least concern’ species are thought to be at risk of collapse (Fraser et al. 2019), and for which ongoing losses of habitat from development pose a threat. The attrition of widespread ecosystems/habitat for species that are not at imminent extinction risk may be less consequential in northern Australia from a conservation perspective, where superficially at least, the vegetation is largely intact (although noting pervasive degrading processes such as overgrazing, invasive species and altered fire regimes in this vegetation). However, out of scope losses pose an issue where the value of the biota extends beyond a western conceptualisation of what is important (e.g., ‘conservation significant’). Indeed, across Australia, and prominently in northern Australia, the value in which different species and ecosystems are held and the importance ascribed to them by Indigenous people extends far beyond the minority of species that warrant consideration in IA with its (western) conservation-centric focus (Barbour and Schlesinger 2012; Ens et al. 2012; Davies et al. 2013; Adams et al. 2014; Ens et al. 2015).

The extent to which biocultural values – ecosystems and species of value to Indigenous custodians and rights holders – are captured in project-level IA, is *ad hoc*. This amounts to a regulatory environment in which species and ecosystems of value to Indigenous Australians can be lost with minimal attention (at least under the EPBC Act; but noting state/territory-level regulatory frameworks which may address this gap). Across multiple projects, of course, this amounts to an accumulation of such losses over a region. Much has been written about the disconnect between different elements of the environmental and social components of project-level IA, with repeated calls for greater integration such that the relationship between (affected) people and nature is better managed (Barbour and Schlesinger 2012; Ens et al. 2012; Davies et al. 2013; Adams et al. 2014; Ens et al. 2015). Linked to this is the need for a much more systematic approach to addressing ecosystem services in IA (Tallis et al. 2015; Sonter et al. 2018; Jones et al. 2019; Sonter et al. 2020a). Crucially though, in the context of development in northern Australia, and specifically under the framing of the EPBC Act, there is no explicit requirement for biocultural values to be formally considered when projects are assessed (i.e., such species/ecosystems are not, in and of themselves, MNES). While guidance is available to assist proponents of development to engage with Indigenous custodians on matters of MNES (Australian Government 2016), this does not extend to overt requirements to assess and manage impacts to biocultural values. Approaches *do* exist to bridge the gap between IA and the assessment and management of biocultural values (see **Part 2** of report); however, their application is discretionary, not mandated.

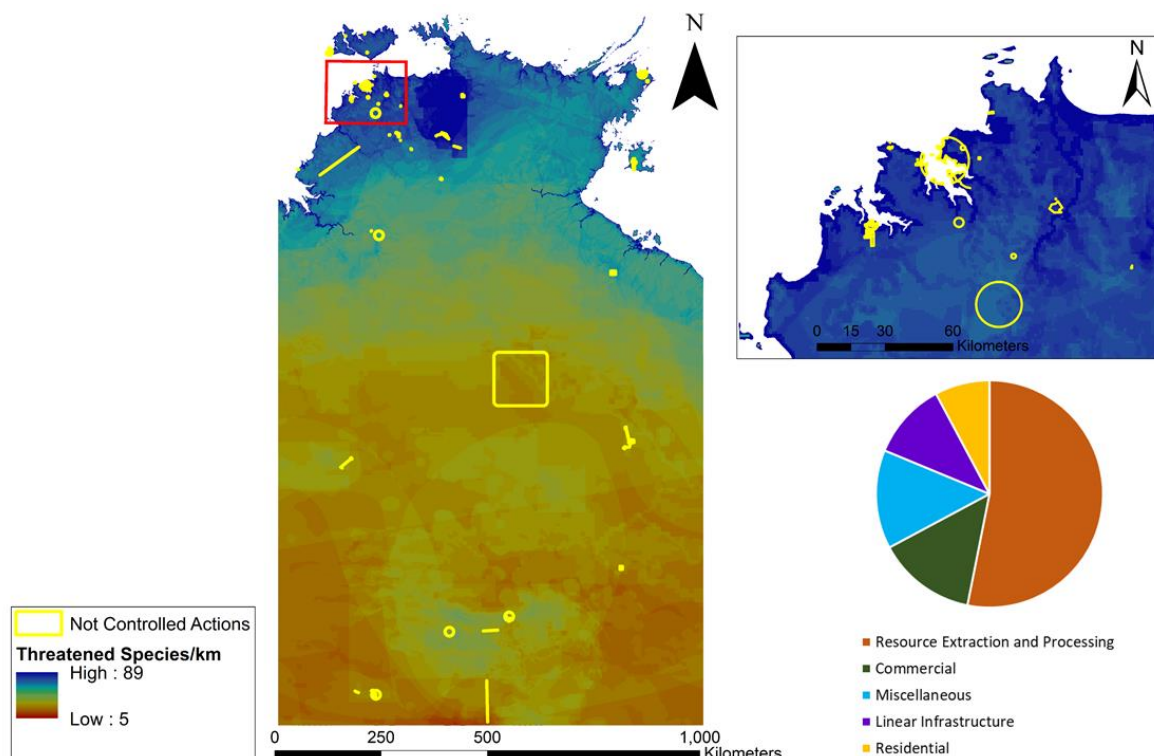
Reason 2: most impacts fall below the significance threshold

The assessment and approval of actions under the EPBC Act (and indeed many other IA instruments) is premised on the notion of ‘significant impacts’ – in short, projects must avoid significant impacts to biota (e.g., MNES) in order to proceed. Commonwealth guidelines outline what constitutes a significant impact for various MNES (e.g., threatened ecosystems, Vulnerable species, Endangered and Critically Endangered species), against a series of criteria (Australian Government 2013). The majority of projects assessed under the EPBC Act since 2000 have been determined to have no significant impacts on MNES (4677 out of 6253 = 75% as at June 2020 (Australian National Audit Office 2020)). In the Northern Territory, a total of 68 proposed actions have been granted approval to proceed on the basis that the activity does not represent a significant impact (**Box 3**) – this represents 56 percent of actions submitted for Commonwealth consideration since 2000.

Many of the projects that are not considered 'significant' do entail losses (e.g. of habitat) (Ward et al. 2019; Dyer and Simmonds 2021), albeit in amount/context that is not considered to represent a significant impact. Importantly, such losses do not trigger dedicated management under the EPBC Act (although they may under state/territory-based legislation) – for example, impacts that are not significant do not need to be addressed (counterbalanced) with biodiversity offsets. For these biota, small and non-significant losses that accrue across multiple projects may become consequential. Such has been the case in northern Australia with the southern black-throated finch (**Box 1**), for which numerous projects have been allowed to proceed, contributing to the so-called 'death by a thousand cuts' for this bird.

Box 3. 'Not controlled actions' in the Northern Territory – actions with no 'significant' impacts.

Since 2000, 68 proposed actions in the Northern Territory that have been 'referred' to the Commonwealth for assessment have been deemed 'not controlled actions' (project footprints in yellow, below). This means each proposed project was considered unlikely to have a significant impact on any MNES (colour ramp on map below: darker = more threatened species per km² (max = 89)). While some of these actions doubtlessly entailed vegetation removal (habitat loss), from a regulatory perspective, this loss was not considered to warrant detailed scrutiny and targeted management. Such losses, through time, add up – an example of how cumulative impacts arise from individual developments.



Reason 3: impact mitigation usually results in net loss

Where an impact is both 'in scope' and 'significant', it triggers a detailed assessment to determine how losses can be managed to the extent that they are considered acceptable. Upon application of the first three steps of the mitigation hierarchy – sequentially, avoid, minimise and rehabilitate – residual ('unavoidable') impacts can and frequently are addressed through biodiversity offsetting. In every year since 2012, >70% of approved actions under the EPBC Act were required to undertake biodiversity offsetting as part of their conditions to proceed (Australian National Audit Office 2020).

Under the EPBC Act Environmental Offsets Policy (Australian Government 2012), the object of an offset action is to ‘maintain or improve’ the affected matter. This is analogous to the more common goal of offsetting (as part of the mitigation hierarchy) – to achieve an outcome of at least no net loss.

However, in Australia, and around the world, biodiversity offsets almost always result in a net loss outcome (Bull et al. 2018; zu Ermgassen et al. 2019; Samuel 2020). The reason is two-fold. First, many offset policies (including that under the EPBC Act) allow offsets to be delivered using a practice called ‘averted loss’. This entails securing a site that contains the biota that was lost from the development, and ensuring it is not lost in the future. The gain is relative – the biota is protected from future loss (the risk of which is often highly uncertain) – however the net outcome across the project and its offset is a loss, *unless* actions are also undertaken to improve the condition of the site (Maron et al. 2018). Without dedicated improvement actions, a realised loss from a development is not counterbalanced with an actual gain (like a new area of restored vegetation; an increase in a species’ population at a site). Rather, the loss is traded for biota that already exists in a landscape.

Second, implementing offset activities on the ground is beset by all manner of obstacles that hinder efforts to achieve absolute biodiversity gains (Maron et al. 2016). Such challenges span environmental, social and economic domains, and include, but are not limited to: uncertainty about how to conserve/restore particular ecosystems/species; time lags in delivering conservation outcomes; issues of land access and tenure limiting opportunities for on-ground activities; sub-optimal governance arrangements (monitoring, auditing, reporting); and long-term economic investment. Of particular note to northern Australia is the imperative of balancing biodiversity objectives with the values and aspirations of local people. Conceivably, biodiversity losses and gains *might* be able to be traded across a landscape so long as key criteria like ecological equivalence and additionality were satisfied. However, rearranging nature in this way poses a real risk to local people including Indigenous custodians and rights holders that their connection to Country (and specific biocultural values therein) will be severed (Griffiths et al. 2019; Sonter et al. 2020a).

Net loss outcomes that may arise as a function of offset policy design (e.g., reliance on ‘averted loss’) and implementation issues compound the losses (‘out of scope’; ‘not significant’) arising from individual projects – yet another contributor to cumulative impacts. Moreover, trading losses and gains (i.e., offsetting) in biocultural landscapes risks disconnecting people with elements of the biota that are of specific or localised value. The three issues we highlight here are but a subset of those that can arise and go unmanaged from individual projects, and thus contribute to an accumulation of impacts/pressures in space and time. Nonetheless, we focus on these three issues here (also see **Figure 1**) as they provide a useful starting point for examining the extent to which taking a wider view – a strategic or landscape-level approach to impact assessment – can help resolve the challenge of cumulative impacts across a dynamic environment like northern Australia, and the Northern Territory in particular.

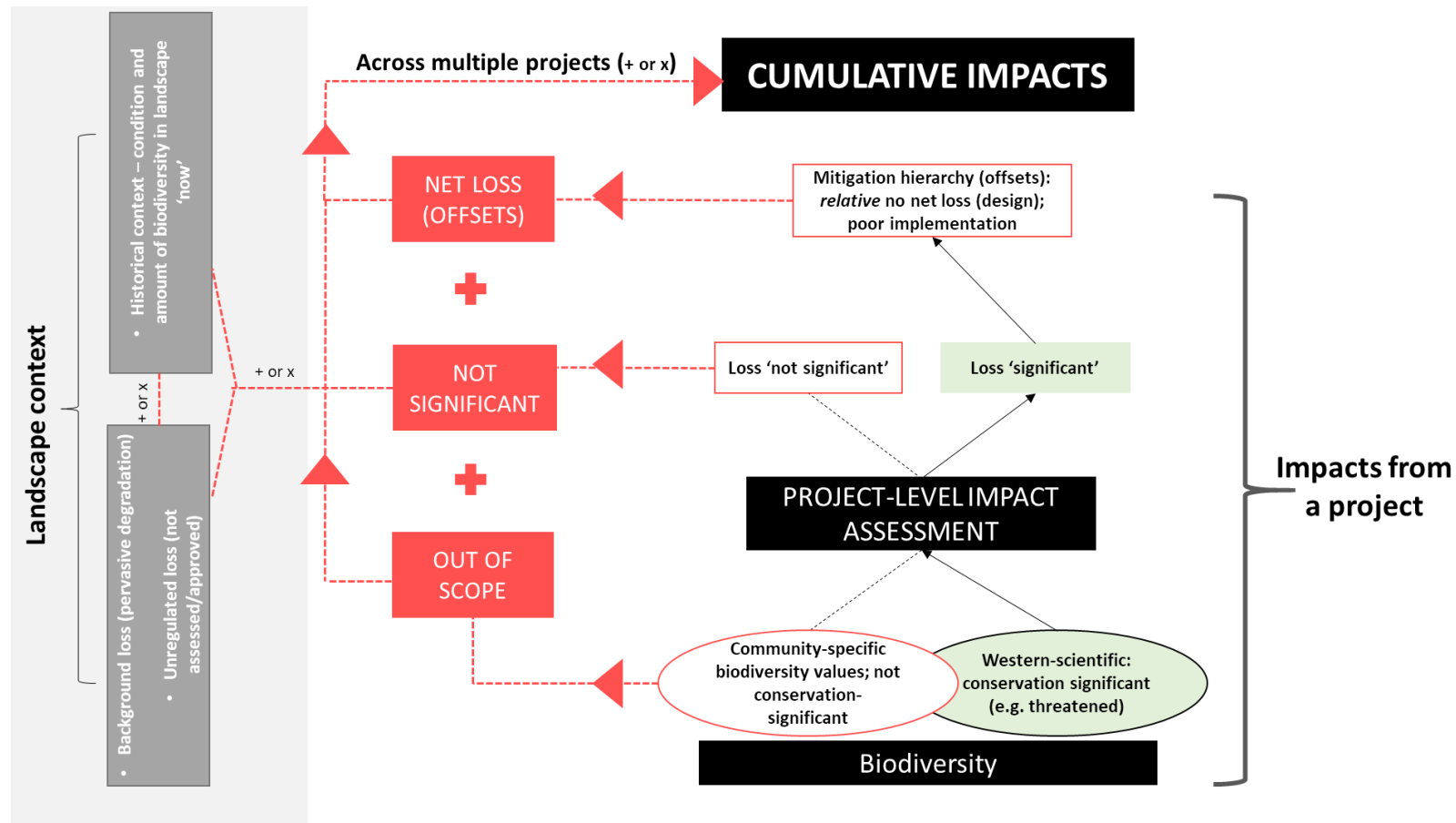


Figure 1. Biodiversity is lost through the project-level impact assessment process for three main reasons (in red): (1) it is out of the scope of the assessment; (2) the loss is not considered to be ‘significant’ (as per regulatory guidelines); and (3) the way in which ‘significant’ losses are managed, especially through offsets, leads to net losses for those biota. On (1), only a small subset of biota are typically accounted for in such assessments, with other biota, such as species/ecosystems with local community (cultural) significance considered in an *ad hoc* way (if at all). Losses to biodiversity that ‘leak’ from project-level assessments may be amplified (‘ + or x ’) depending on the context of the surrounding landscape – its pattern, condition, and the extent to which various threats prevail (in grey). Across multiple projects, such losses accumulate and interact (‘ + or x ’), with the outcome being cumulative impacts.

Does strategic assessment address these issues?

Considering multiple proposed activities across a landscape under the framing of a strategic assessment only partially addresses the three key issues we highlight above (**Figure 2**). That is, despite considering multiple actions in aggregate, positioned withing a broader landscape context, losses will still likely occur and accumulate. We suggest that these issues – ‘scope’, ‘significance’, ‘net losses’ (offsets) – which are at the heart of the cumulative impacts problem, are actually fundamental issues with IA *per se*, and are not exclusive to project-level assessments.

In regulatory frameworks like the EPBC Act, strategic assessment does offer some advantages over project-level assessments. For example:

- Where significance thresholds apply (i.e., triggers for whether an action warrants rigorous scrutiny and dedicated management), aggregating impacts among multiple actions in a strategic assessment may mean that the quantum of assessment and management for in-scope biota that are affected by development is increased. In other words, the chance of a loss not being significant at a strategic level is lower, because the extent/magnitude of impacts presumably increases as the lens widens beyond an individual project focus. Taking a strategic approach in regulatory contexts where significance tests determine what does and does not get managed, could ameliorate the syndrome of ‘death by a thousand cuts.’
- Strategic assessment may present opportunities to aggregate offsets (e.g., combine offsets from multiple actions into one or several ‘large’ offsets) and/or strategically site offsets in a landscape (e.g., to support ecological functions like connectivity).

In spite of these benefits, moving beyond project-level assessments to a strategic approach does little to rectify the losses that occur from individual projects, and accumulate across multiple actions, due to:

- ‘Scope’ – quite simply, if the environmental values (species, ecosystems etc.) that require consideration at a strategic level are the same as those triggering assessments at the project-level, conducting assessments at a broader scale will not directly address losses to these biota (other than incidental benefits from actions targeting ‘in-scope’ biota at a landscape level).
- ‘Net losses’ (from offsets) – similarly, if an offsets policy applies the same ‘rules’ irrespective of the scale of assessment (project-level/strategic), outcomes for biota are unlikely to be greatly enhanced by conducting strategic assessments. Notwithstanding the potential for strategic siting of offsets, the built-in net loss design of the prevailing ‘averted loss’ paradigm may render these aggregated/strategic actions only marginally better than project-level (averted loss) offsets. Opportunities to harness offsets towards much better outcomes, via emerging frameworks like ‘target-based ecological compensation’ (Simmonds et al. 2020; Maron et al. 2021) represent an opportunity to truly make landscape-level assessments strategic (see **Part 2**, below).

Furthermore, rearranging nature across landscapes through losses (development) and gains (biodiversity offsets) presents a very real risk that local community connections to nature will be severed. ‘Zooming out’ to a strategic level may prove beneficial from the perspective of prioritising sites for conservation actions (like offsets), but at the same time, may dilute understanding and assessment of highly localised biodiversity values and other values of importance to communities. This is exacerbated by the fact that biocultural values tend not to be ‘in scope’ for assessments such

as those conducted in the EPBC Act framing, thus rendering their consideration and management highly inconsistent – a factor that strategic assessment does not resolve.

1.5: The status quo of assessing and managing cumulative impacts in northern Australia

While taking a strategic/regional approach has been empirically demonstrated to promise enhanced biodiversity outcomes in Australian case studies (Kujala et al. 2015; Whitehead et al. 2017), its effectiveness *vis-à-vis* project-level IA remains uncertain (Gutierrez et al. 2021). Our conceptual examination of three key reasons as to why losses emanate from individual actions, and thus accumulate across multiple actions, indicates that strategic assessment may only partially rectify these issues. Worse, without careful scrutiny and proactive, meaningful engagement, it may enable sub-optimal outcomes, where biodiversity is lost/gained across cultural landscapes in which multiple rights holders variously value elements of the biota but lose/gain it in different ways.

The limitations of IA – be it project-level or strategic – are largely a function of policy design: namely, what counts (scope), what losses matter (significance), and how losses are managed (offsets). Of course, on ground challenges relating to data availability (e.g., baseline assessments) and managing impacts (e.g., delivering offsets) place further constraints on comprehensively managing a project's (or multiple projects') impacts. These policy and pragmatic factors come into sharp focus in a region like northern Australia, and a jurisdiction like the Northern Territory particularly, because of the intersection of Indigenous peoples' rights and aspirations, rich biodiversity, and corporate development interests. Moreover, the regulatory system that frames development assessment in northern Australia (Commonwealth level, but also in the Northern Territory), is the subject of reform. At the Commonwealth level, an independent review of the EPBC Act recommended a far greater adoption of strategic assessment (as part of a broader move to regional planning), entailing a shift away from project-level assessments (Samuel 2020). Our conceptual examination of the benefits and risks of strategic assessment indicate that such a move, in isolation from a more holistic approach to planning and decision making, requires careful consideration.

In **Part 2** of this report, we set out a high-level framework for achieving improved outcomes from IA in the Northern Territory, that harnesses a wide array of existing products, tools and approaches to help strike a balance between Indigenous values and aspirations, biodiversity conservation imperatives, and economic development. This framing is a starting point – it showcases what options are readily available to guide the IA process, what information is lacking, and where key conceptual and policy advances are needed to 'join the dots' between regional planning, IA (strategic or project-level) and development, and desirable outcomes for people and nature.

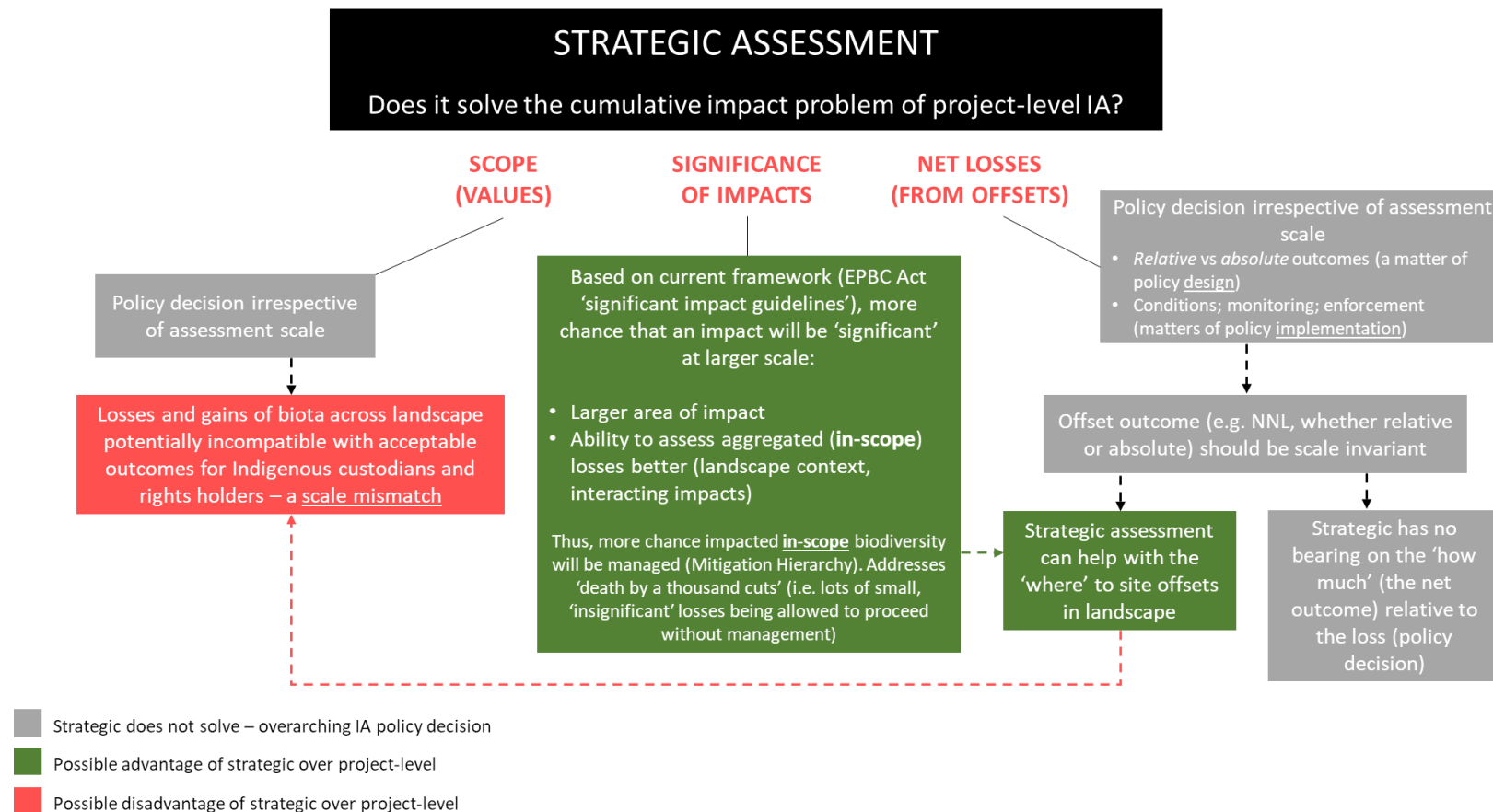


Figure 2. Strategic assessment (e.g., SA under the EPBC Act) – assessing and approving multiple projects at a landscape/regional level – is proposed as a key tool for addressing the problem of cumulative impacts that arise from project-level IA. In a regulatory framing where ‘significance’ tests apply to impacts on in-scope biota, SA provides an advantage over project-level assessments. This is because losses aggregated among multiple projects are more likely to satisfy significant impact ‘triggers’, than if each loss was considered in isolation. However, other main causes of losses from development – the fact that much biota is ‘out of scope’, and the suboptimal way in which ‘significant’ impacts to in-scope biota are managed via offsetting – remain unresolved by taking a wider lens to impact assessment. Moreover, rearranging nature through losses and gains at landscape level poses a risk to local communities for whom elements of the biota hold cultural or spiritual value. The coarser resolution of SA may mean that this approach is less well-placed to identify, assess and manage highly localised patterns of biota, the value of which can be heterogenous among multiple communities in a region.

PART 2: MANAGING DEVELOPMENT IN THE NORTHERN TERRITORY – OPPORTUNITIES AND QUESTIONS

In **Part 1** of this report, we suggest that three inherent elements of IA frameworks (like the EPBC Act) are fundamental to explaining why development projects result in biodiversity losses. It is these losses (e.g., of habitat) which can subsequently accumulate across a landscape, in addition to or in interaction with losses from other projects as well as pervasive or unregulated agents of change. We conclude that taking a strategic lens to IA, in the absence of a broader framing, may not resolve the root cause of these losses. Furthermore, the rearrangement of nature across a landscape – assuming biodiversity that is affected by any particular development is amenable to offsetting in the first place – may disconnect communities from biota of cultural value. This entails an outcome that is bad for Indigenous people, and given the longstanding custodianship of Australia’s landscapes, bad for nature too.

Focusing on the Northern Territory, here we set out recommendations to help alleviate the ubiquitous cumulative impacts problem, while at the same time envelop IA in a framing that delivers outcomes that are beneficial for nature and people *vis-à-vis* that status quo. The framing we present is a ‘conversation starter’ – it is by no means comprehensive, nor should it be considered a definitive roadmap for evolving IA policy and practice. Rather, it showcases four key considerations for enhancing IA outcomes, the bulk of which draw from existing information and protocols that are available or under development in the Northern Territory. We do not propose a complete overhaul of IA, with the retention of its key operating components – baseline assessment / application of mitigation hierarchy / monitoring and adaptive management of mitigation measures – essential to delivering outcomes that work for nature, people and business.

Beyond presenting a way to reconcile the challenge of cumulative impacts and resolve questions around the scale at which development projects are best assessed (project-level; landscape-level (strategic)) (as per **Part 1**), this indicative framing provides an opportunity to align IA more systematically with outcomes that are increasingly likely to shape development decision-making in the future. Specifically, IA is recognised as a key tool for delivering the sustainable development outcomes that are needed to make the CBD’s 2050 vision of people ‘living in harmony’ with nature a reality. More proximally, the (2030) milestones and ‘action targets’ that are being proposed under the draft CBD Post-2020 Global Biodiversity Framework are of an increased ambition compared to previous global agreements – a recognition of the parlous state of biodiversity – underscoring calls for ‘transformative change’ (Secretariat of the Convention on Biological Diversity 2020). The way IA is framed in policy and delivered on the ground, must transform to align with the Post-2020 agenda. Importantly, the EPBC Act is Australia’s key vehicle for delivering on international commitments such as those enshrined in the CBD – it is thus especially important that this legislative instrument (and any reform thereof, including devolution of assessment and approval powers to states/territories) deliver on the ambition of a new set of global targets for biodiversity and sustainable development.

Part 2 of this report is divided into two subsections:

- 2.1: recommendations for enhancing IA policy and practice in the Northern Territory, founded on existing/under development approaches and protocols
- 2.2: description of the process being undertaken for the ‘Strategic Regional Environmental and Baseline Assessment’ that is underway to inform assessment of the impacts of the proposed Beetaloo sub-basin onshore gas industry

2.1: Improving IA effectiveness in the Northern Territory

Consideration 1: Contextualising development decision-making

Decision-making frameworks that draw on IA as an input are often framed by implicit or unmeasurable objects and goals. In other words, they lack clear, outcomes-based targets – for example, a time-bound outcome state for biota that the framework and decisions made under it must achieve or contribute towards. This is a key gap in IA currently, and means that decisions tend to be made in a vacuum of context. Besides the fraught objective of ‘no net loss’ (see **Part 1**), the way in which IA contributes to or detracts from conservation and sustainability imperatives is difficult to track, because there is rarely an overarching plan to which these outcomes are explicitly linked. This afflicts both project-level and ‘strategic’ assessments.

Contextualising IA is fundamentally reliant on the establishment of clear, agreed-upon outcomes for the people and biota affected by development across a particular space, and within a certain period of time. Such a framing is a key recommendation for reforming the EPBC Act – the need for national and regional planning instruments that establish clear outcomes (e.g., for MNES) upon which to guide decisions (Samuel 2020). The recommended approach to realise the outcomes established in planning instruments are ‘National Environmental Standards’ (Samuel 2020). This translates to a system in which overarching outcomes (synonymously, targets) are established, and for which decisions (i.e., about new development) are guided by a set of standards that ensure actions are consistent with the targets being achieved.

Planning in advance of new development, where the outcomes to be achieved by each development (the ‘goal posts’) are established up front, gives context to decisions about what and where development should occur, and if and how it can be effectively managed. While regional planning and National Environmental Standards under the EPBC Act represent one model for setting these goal posts, in the absence of such a framework, regional/jurisdictional outcomes can and should still be central to decisions around new development. The aforementioned CBD Post-2020 Global Biodiversity Framework, and the goals, milestones and action targets therein, are a useful platform to focus jurisdictional/regional planning and desirable outcomes upon.

Placing IA in a broader context will not only help with the siting and management of development but may also help to clarify questions around what constitutes an appropriate decision-making space (**Figure 3; Figure 4**). For example, strategic (or regional) assessments necessarily must be spatially bounded – where should this line be drawn? The boundary matters, because the space over which assessments are done and decisions are made is consequential for people within that space, and the biotic and abiotic factors that are the focus of decisions. To exemplify, a decision-making space founded on a resource basin likely intersects but does not fully capture the full extent over which different communities reside/have connection, species range, or rivers/groundwater flows (see **Part 2.2; Figure 4**). This may become less problematic where clear outcomes for that decision-making space are established, *and* these outcomes are linked to a broader (overarching) set of targets for (for example) biodiversity. However, of absolute primacy to the establishment of desirable outcomes across regions in the Northern Territory is that these be formulated with, and reflect the aspirations of, Indigenous custodians and rights holders.

Consideration 2: Empowerment of Indigenous custodians and rights holders in development decision-making

Under existing IA frameworks like the EPBC Act, the management of Cultural Heritage (as well as consideration of community economic and cultural aspirations), and the extent to which Indigenous people are proactively and meaningfully engaged in development decision-making, is inadequate. The IA process must be evolved to redress the power imbalances that prevail. A range of recommended approaches/existing protocols can and should be considered in evolving IA policy and practice in the Northern Territory. These might include, but should not be limited to:

- Establishing local, regional, and jurisdictional (Territory-wide) outcomes for Country that are developed by and reflect the values, desires, and aspirations of Indigenous people.
- Enhancing the application of approaches like ‘Healthy Country Planning’ and Development by Design (see **Box 4**) whereby Indigenous custodians are empowered to map the values of and aspirations for Country. Crucially, tools like Healthy Country Plans and Development by Design projects should act as a key reference for decisions about where proposed future development (by external actors) can/cannot be sited, and how it should be managed.
- Incorporating Indigenous-led economic and development aspirations and pathways (e.g., ‘Business on Country’ (CRCNA 2020)) into planning and decision-making in IA.

Impact assessment – especially for individual projects, but also strategic assessments of proposed development plans – is often conducted only after key decisions have already been made. This can disempower Indigenous people, whose Country may be the subject of these decisions (noting that land tenure and land rights do have a bearing on the extent to which Indigenous custodians can influence (already made) decisions). The establishment of outcomes upon which to frame these decisions (prior to and during the IA stage of proposed development) that are led or informed by Indigenous people, can help to redress this imbalance. Plans for Country, like Healthy Country Plans, which ideally, could be nested in regional or jurisdictional outcomes, provide a high-resolution tool for Indigenous people to engage with proponents of development in a proactive (not reactive) manner.

Taken together, overarching targets complemented by community-level plans, may fill the void of the ‘scope’ issue discussed in **Part 1**. Specifically, embedding Indigenous values and aspirations in specified outcomes for Country provides an opportunity for decisions (e.g., by proponents, about where and how to manage development) to be explicitly guided by what people on Country want and consider to be acceptable (in such a way that Indigenous custodians are ‘on the front foot’, with the information (should it be shareable) to feed into this decision-making at hand). With further reference to **Part 1**, this type of framing could inform decisions about the acceptability of ‘rearranging nature’ across a landscape (e.g., via offsetting), where more than one community group has connection to a landscape and its biota.

Box 4. Healthy Country Planning and Development by Design in northern Australia (Heiner et al. 2019).

Impact assessment – be it project-level or strategic – is increasingly used to assess the social and economic impacts of development activities. However, the values considered in IA processes have historically been centred around environmental attributes, with a heavy focus on biodiversity. This separation has been recognised as problematic for managing environmental *and* social values in tandem; in places like northern Australia, integrated approaches that explicitly consider Indigenous biocultural values have been touted as essential for landscapes where Indigenous custodianship of nature is juxtaposed against economic development interests.

To examine this separation of values within the IA space, The Nature Conservancy and Walalakoo Aboriginal Corporation used Healthy Country Planning (Carr et al. 2017) and community-based Development by Design to incorporate biodiversity *and* cultural/social values into decision-making on development risks and opportunities (Heiner et al. 2019b). The study area was within the boundaries of the Nyikina Mangala Native Title Determination which contains the Lower Fitzroy River and delta, located within the Kimberley region in the north of Western Australia. This area is the focus of various development activities, thereby underscoring the importance of integrating biocultural values into the IA decision-making space. Values described by Traditional Owners in the *Walalakoo Healthy Country Plan* (Walalakoo Aboriginal Corporation 2017) were used by the community to define priority sites, areas, and elements of biota for which development impacts were (for example) to be avoided. This information (on values) was then organised into a spatial dataset to inform development planning, impact mitigation, and their integration with community resource management.

Healthy Country Planning and community-based Development by Design processes provide a model for guiding decisions on the terms of Indigenous custodians and rights holders. Specifically, it provides a framework for a community to be engaged to define conservation values or targets, which can then be used to formulate adaptive management plans (which can be incorporated into IA) that are inclusive of cultural and environmental values. This process provides one pathway for redressing power imbalances in planning and decisions around new development. Importantly, cultural values are not static, and may change over time – any planning frameworks that consider cultural values in such an integrated way as Healthy Country Planning does must also be adaptive and participatory to allow for regular updates or revision.

Consideration 3: Consolidating information

Northern Australia is the focus of intensive planning, scenario analysis, scientific research, and environmental monitoring. A wealth of environmental information, which is increasingly integrating biocultural values under the leadership of or in partnership with Indigenous custodians, exists to guide the IA process. However, much information is produced by disparate sources, and a consolidated picture of what we do and do not know is lacking. Making the most of the data and information we have at our disposal is crucial because, once consolidated, such information can underpin the establishment of outcomes-based targets or the definition of regional boundaries within which dedicated planning and assessment activities can occur, as well as provide baseline data on ecological, cultural, and abiotic values that can inform application of the mitigation hierarchy. However, we also recognise the spatial data of culturally significant places or values may not be appropriate to consolidate or share beyond Traditional Owner groups or Indigenous organisations (Heiner et al. 2019) and this must be respected.

Rather than provide an incomplete list of data sources/protocols, we highlight two prominent examples that represent mechanisms by which to acquire and consolidate information to guide better decisions about new development.

- **Integrated environmental assessment:** Integrated environmental assessment (IEA) is a policy-oriented, interdisciplinary process intended to combine knowledge from various interacting scientific disciplines and knowledge systems to inform and enhance decision-making (National Environmental Science Programme 2020). Due to the policy and development interest in northern Australia, IEA and the information gained through this process could be a valuable tool to assist in and improve the types of decisions being made by governments, investors, and key stakeholders (National Environmental Science Programme 2020). For example, through the IEA process, key sites for development may be able to be identified, while other sites could be prioritised for protection, both for environmental and cultural values. This synthetic approach to data collation and management may act as an avenue towards ‘de-risking’ investment, by reducing uncertainty in decisions (National Environmental Science Programme 2020).
- **Landscape-level baseline studies:** A key recommendation of the independent *Scientific Inquiry into Hydraulic Fracturing of Onshore Unconventional Reservoirs in the Northern Territory* was for the delivery of a detailed environmental baseline assessment of a key resource area – the Beetaloo sub-basin (The Scientific Inquiry into Hydraulic Fracturing in the Northern Territory 2018). We provide a brief overview of the recommended ‘Strategic regional environmental and baseline assessment’ (SREBA) in **Part 2.2**, and position it with respect to the factors we examine in this report – namely, cumulative impacts, assessment and management of impacts at multiple scales, and the incorporation of biocultural values in decision-making.

Consideration 4: Using the mitigation hierarchy to achieve desirable net outcomes

There is increasing momentum towards aligning the activities of actors that affect/rely on the environment, with the net outcomes that will underscore the success of the UN CBD Post-2020 Global Biodiversity Framework (Bull et al. 2020; Maron et al. 2021; Milner-Gulland et al. 2021). This is highly pertinent to proponents of development, where activities are already framed by net outcomes – namely, no net loss (and increasingly, net gain), as a result of implementation of the mitigation hierarchy. However, as noted in **Part 1**, the mitigation hierarchy, by virtue of its last step – biodiversity offsetting – generally fails to deliver these outcomes (at least, in absolute terms).

Providing context around application of the mitigation hierarchy (see **Consideration 1**, above) is a crucial missing link in current policy and practice, and one that enables (and masks) the sub-optimal outcomes that have typified offsetting to date. However, where context, like a regional or jurisdictional plan that specifies outcomes-based targets for species/ecosystems, exists, the mitigation hierarchy can be co-opted towards these targets’ achievement. Having clear outcomes can assist with decisions about what should be avoided (step 1 of the mitigation hierarchy). This can extend to key values – irreplaceable sites/places, ecosystems – for which no losses can occur (and for which regional planning and strategic assessment approaches can help identify). It can also help frame difficult decisions where avoidance is challenging – a very real issue in a structurally intact environment like (much of) the Northern Territory, where impacts will be hard to avoid despite efforts to follow the first and second (minimise) steps of the mitigation hierarchy. This is where alternative approaches to traditional biodiversity offsetting can play a role. Target-based ecological compensation (Simmonds et al. 2020) is a novel framework, whereby the amount of compensation for a given loss (e.g. to a species population; ecosystem extent), is scaled to provide a proportionate contribution to the achievement of a conservation target for the affected species/ecosystem. To exemplify, where a target was to double the area of a particular ecosystem type, and where a development caused the (unavoidable or residual) loss of 100 ha of that ecosystem, restoration at a

ratio of 2:1 would be required – here, the creation of 200 ha of restored habitat (at the expense of the lost 100 ha) is consistent with the target to double the ecosystem’s extent. Such an approach, that harnesses compensation for losses that are unavoidable (a factor which is likely to be prevalent in many ‘greenfield’ sites in the Northern Territory, notwithstanding irreplaceable sites/biota that must not be lost), can help achieve broad conservation targets in a way that traditional offsetting rarely does.

The Northern Territory Government has adopted the principles of target-based ecological compensation in their emerging offsets framework, under the new *Environment Protection Act 2019*. Notwithstanding various critiques of the ‘traditional’ approach to offsetting (e.g. under the EPBC Act (Samuel 2020)), the Northern Territory Government has recognised that a ‘fit for purpose’ offsets model that (1) directs compensation towards the key threats to biodiversity (e.g. pervasive threats like fire and invasive species); and (2) is amenable to delivery of landscape-level outcomes (biodiversity targets), given the cultural, social and land tenure context of the jurisdiction, represents a better way forward than ‘averted loss’ approaches (Northern Territory Government 2020). Where avoidance of losses is hard, directing compensation for such unavoidable losses towards landscape-level threat reduction targets is an opportunity to align development and conservation imperatives.

Framing ecological compensation (offsetting) in targets helps to address the issue of net losses (**Part 1**) that arise (by design) from offsetting as currently practiced, thereby reducing a cause of cumulative impacts. Target-based ecological compensation can also be integrated with spatial planning approaches at a regional scale (such as ‘Development by Design’ (Kiesecker et al. 2010)) where the question of ‘how much’ compensation should be provided for a given loss (target-based compensation) can be addressed at the same time as ‘where’ should compensation be delivered (spatial planning). Of course, a key factor to consider here is the integration of biocultural values – underscoring the role for Indigenous leadership and engagement in processes like Healthy Country Planning, and the establishment of targets for biota within and beyond the Country for which any group/s has/have custodianship over.

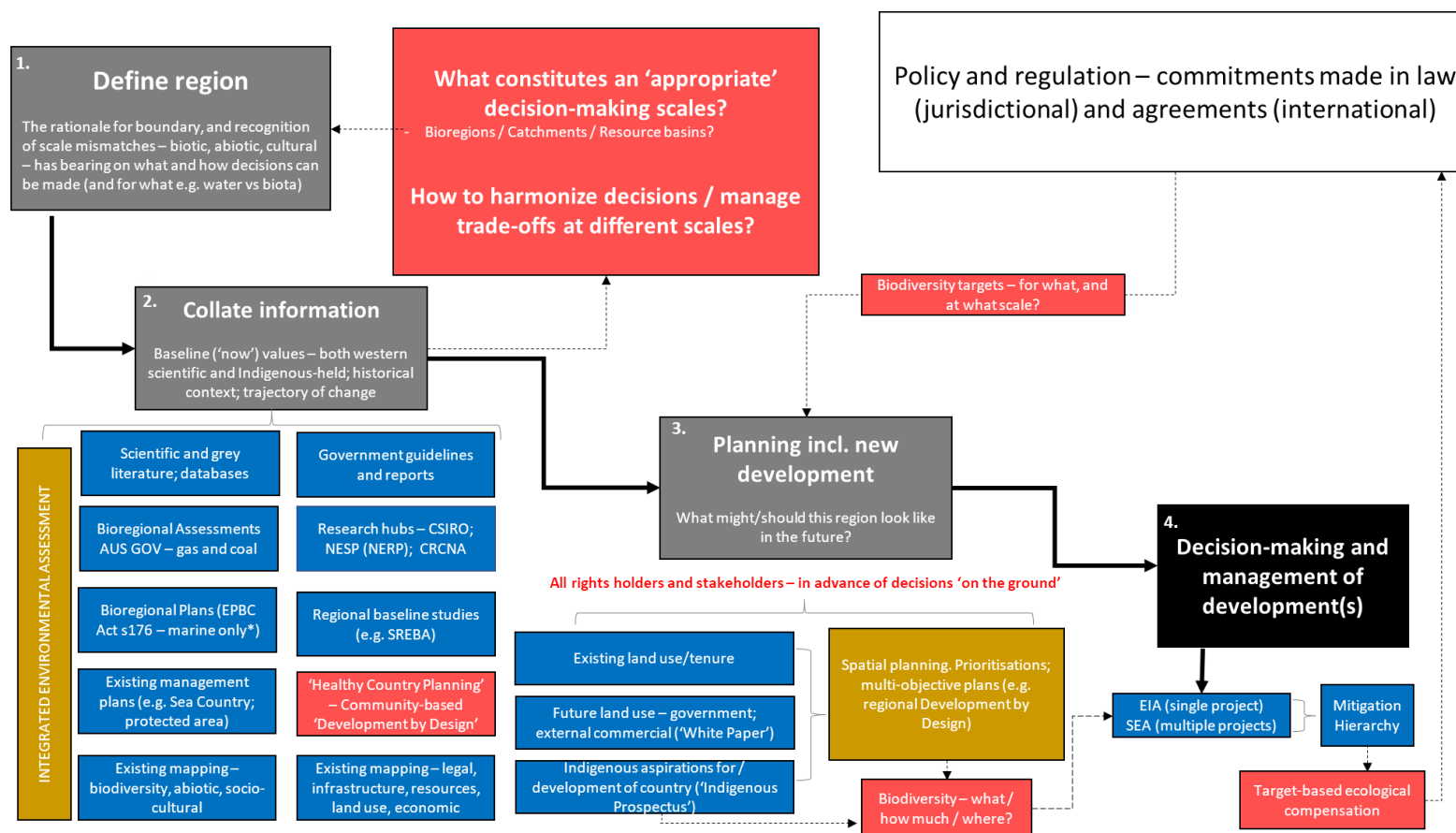


Figure 3. Regional planning (steps 1-3 (grey boxes)) has the potential to greatly simplify and enhance the effectiveness of decisions about new development (step 4 (black box)). Many of the tools and protocols, and much of the information and data (including Indigenous knowledge, where this is willingly shared and respectfully used), is at our disposal (blue squares) in northern Australia, albeit recognising spatial gaps in information. Frameworks for organising and utilising this information exist but are currently unharnessed (brown boxes). For northern Australia, it is a matter of 'joining the dots', and the framing here provides a simplistic view of what this could look like, while at the same time, illuminating key gaps in knowledge and practice (red boxes) that require attention (see **Part 3**). Crucially, regional planning, and its translation to IA, should be placed in a broader context still – quantitative, outcomes-based biodiversity targets that reflect jurisdictional policy and international commitments. Targets provide clear 'goal-posts' for planning, and ultimately for decisions and actions on the ground (e.g., IA) – key amongst these are that they can help to negate the accumulation of impacts across multiple actions, thereby addressing (in part) the issue of cumulative impacts.

2.2: The Beetaloo sub-basin SREBA – gathering information to guide impact assessment

As a key recommendation of the independent *Scientific Inquiry into Hydraulic Fracturing of Onshore Unconventional Reservoirs in the Northern Territory*, the Northern Territory Government (2021) has produced a framework that describes the objectives and content of a so-called ‘strategic regional environmental and baseline assessment’ (SREBA) for the Beetaloo sub-basin. A key obstacle to progressing development in the Northern Territory is a lack of baseline information on biodiversity assets and their spatial location. This impedes the ability of stakeholders and regulators to accurately and holistically assess the risks and cumulative impacts of development, such as the proposed onshore shale gas industry (Northern Territory Government 2021). The SREBA consists of a set of studies that establishes baseline environmental data to address knowledge gaps and can be used to assess the potential impacts of development activities on the existing environment (Northern Territory Government 2021). This ‘strategic’ approach to data collection over large regions with multiple stakeholder interests can achieve consistency in datasets, making them a valuable tool for region-wide assessment (Northern Territory Government 2021). A key impetus for taking a regional approach to baseline data collection is that it better positions proponents of development to be able to consider cumulative impacts on key biota, and identify conservation and/or planning outcomes at a larger scale than a project-by-project approach (Northern Territory Government 2021). However, by design, the SREBA does not replace project-level impact assessment or approval processes – rather it provides a comprehensive and consistent source of information to guide them.

Within the SREBA framework, the term ‘domains’ is used to describe the various study areas (e.g., ‘Terrestrial Ecosystems’, ‘Environmental Health’, ‘Social’, ‘Cultural’, ‘Economic’ etc.). Their respective spatial boundaries have been defined to encompass the environment on which development activities could have an impact (including cumulative impacts and indirect impacts), and to provide context upon which determinations of the ‘significance’ of impacts can be adjudged (Northern Territory Government 2021). However, defining the overarching boundary of a regional decision-making space (arbitrarily or based on resources/economic criteria – as is the case with the Beetaloo sub-basin SREBA) may have adverse implications for biodiversity and people, if not carefully managed (e.g., nested within a broader set of (jurisdictional) outcomes). No one boundary will ever be sufficient to capture the various considerations required for the IA process, but arbitrarily defining a boundary based on a resource basin can embed a disconnection from ecological (and cultural) factors (and their respective boundaries), which are paramount in decision-making (**Figure 4**).

Baseline data collected from the various domains of the SREBA will include information on values, beliefs, goals, aspirations, perceptions, attitudes and community capital across a region, however the engagement of Indigenous Australians and their values should not be limited solely to the social, cultural and economic studies (Northern Territory Government 2021). This is because of strong connections between people/communities to all aspects of the environment, which can vary between and within community groups (Heiner et al. 2019b). There is significant overlap of cultural and biodiversity values, hence assessment of terrestrial (or aquatic) ecosystems should consider the social/cultural values associated with ecosystems or particular species.

The assessment of species in the context of the SREBA generally applies to ‘significant species’; these species include MNES (see **Figure 4**), narrow-range species or species of high cultural value within the SREBA boundaries (Northern Territory Government 2021). Key outputs of the SREBA with respect to terrestrial biota include species distribution models, and the identification and mapping of areas of ‘high conservation value’ (this term is generally understood to refer to areas that contain biological values deemed significant at a regional, national, or global scale) (Northern Territory

Government 2021). These values (as defined at a regional scale) may or may not align with what Indigenous people value at a local scale, and so the conservation priorities of western-science and Indigenous custodians may differ due to a scale and/or values mismatch, which is why the proactive engagement of Indigenous Australians in all domains of a SREBA is crucial. It is important to recognise the value of specific ecosystems or species may also differ between rights-holding Indigenous groups within a region and it is important that these differences are recognised. Common or widespread species (with associated cultural significance) may be easily detected in regional surveys (as part of a SREBA); for those that are not detected, additional targeted surveys or habitat modelling may be required, highlighting once again the importance of consultation with Indigenous Australians (Northern Territory Government 2021). If this consultation is not undertaken, it can limit the extent to which Indigenous custodians are empowered to meaningfully guide the SREBA process and lead decisions about Country.

While the SREBA represents an advance on many regional development approaches with its proactive and systematic approach to data collection, an apparent lack of an overarching framing/context for how the decisions that will use this baseline data are to be made risks sub-optimal outcomes for biodiversity, Indigenous Australians, and proponents of development. Unless planning and decision-making is contextualised, regional/strategic exercises to inform planning and decision-making (such as the SREBA) may not ameliorate the flaws of existing IA, where losses accrue and accumulate. However, the Northern Territory Government's move towards a target-based offsetting framework has the potential to alleviate some of these risks.

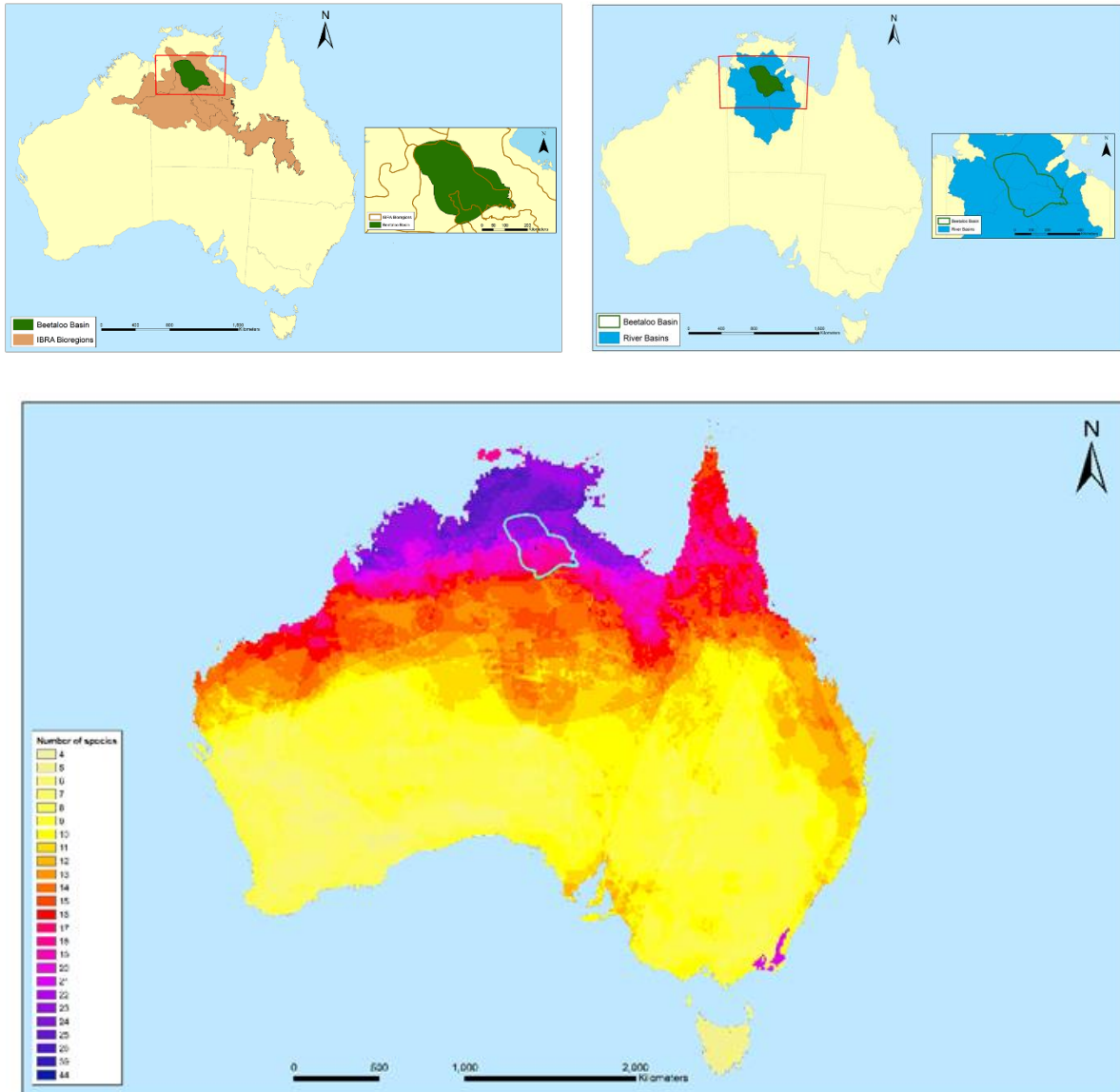


Figure 4. The boundary of the SREBA (indicatively, the boundary of the Beetaloo sub-basin; in green), as it overlaps IBRA bioregions (top left); river basins (top right), and the distribution of EPBC Act listed threatened and migratory species (bottom). In all cases, the SREBA boundary does not holistically encapsulate these different representations of biota/the environment. A regional approach to IA – here, to baseline data collection – must still reflect ecological (and cultural) connections that extend beyond what is an arbitrary regionalisation. The determination of impacts (what, where, ‘significance’), and if/how they can be managed, needs to be undertaken in the context of the entire extent over which (for example) a species occurs or a river flows. Establishing clear outcomes-based targets for species, ecosystems and other environmental factors at a broader level – for a jurisdiction – can help to provide this overarching context.

PART 3: RECOMMENDATIONS AND NEXT STEPS

In this report, we explored the overarching question: *at what scale, and within what broader framing, should IA be conducted in northern Australia?* Our intention was to provide an overview of key elements of the development decision-making space, focusing on biodiversity and biocultural values, which are likely to be prominent considerations in managing the ‘development of the north’.

Key themes we explored included:

- Cumulative impacts;
- The spatial scale over which impacts should be assessed and managed;
- Power imbalances in decision-making – here, in the context of biocultural values and their consideration in decision-making;
- Contextualising IA in overarching outcomes; and
- The limitations and opportunities of the mitigation hierarchy, and especially its final step – biodiversity offsetting.

In examining these themes, we suggest several **recommendations**. These are pertinent to the policy and practice of IA globally, but we emphasise their applicability to the specific context of northern Australia, where Indigenous custodianship and aspirations for Country, a rich but at-risk biota, and various development initiatives, all coincide.

To guide development decision-making, and especially IA in northern Australia, we suggest the following:

1. Decision-making around development be framed by **overarching outcomes-based targets** for biodiversity and biocultural values. What constitutes the ‘right’ spatial scale for biocultural targets (should this notion be helpful for empowering ownership in decision-making) should be at the discretion of Indigenous custodians and rights holders. Such targets can and should be central to **regional planning initiatives, and should link through to jurisdictional (e.g., national, state/territory) commitments** for biodiversity conservation. The establishment of targets, underpinned by the consolidation (and ongoing acquisition) of information across the north, will help to contextualise decisions. What should be off limits, what losses are acceptable, and how/where losses can best be managed – all such decisions can and should be made in consideration of how they contribute to or detract from targets. This provides clear ‘goal posts’ for stakeholders and embeds transparency and accountability in decision making and the actions it precipitates. Having targets could:
 - a) help to address the **cumulative impacts** issue – no longer will losses, including those that ‘leak’ from individual projects — occur in a vacuum of context; the consequence of such unmanaged losses will be clearly discernible with respect to how they detract from a target’s achievement. In short, this should translate to a more thorough coverage of the assessment and management of biodiversity losses from development.
 - b) alleviate **issues of scale** – questions about whether project-level or strategic (e.g., landscape-level) assessment is more appropriate will be less consequential if decisions are made with reference to some overarching set of outcomes/targets. Noting the potential benefits of taking a wider lens (e.g., strategic assessment may be better placed to examine issues of change in landscape pattern and help aggregate/prioritise mitigation measures like offsets), uncertainty about where to

‘draw the line’ for a strategic/regional assessment exercise will also be less of an issue if this decision-making space is contextualised within some broader desired outcome state.

- c) **empower Indigenous custodians** and rights holders to proactively shape decisions on Country, where targets are established by and reflective of locally held and regionally-shared values.
2. Tools like **Healthy Country Planning and community-based Development by Design** which can provide a framework for biocultural values to be documented, should be rolled out more extensively (but only where this is requested by / beneficial to communities). Broader development of Healthy Country Plans could help to establish community-based targets for biocultural values, which could subsequently act as central considerations in regional planning and strategic assessment activities. Moreover, the scope and ambition of Healthy Country Planning activities could be expanded and run in tandem with Development by Design (see Heiner et al. 2019), such that these not only inform decisions relating to the development aspirations of external actors, but also map out development scenarios led and progressed by communities.
3. Recognising the limits and flaws of the existing biodiversity offsetting paradigm and noting the direction the Northern Territory is taking with their nascent policy, uptake of alternative models like **target-based ecological compensation** should be considered. This links to **Recommendation 1**, whereby development decision-making is contextualised by outcomes-based targets, and **Recommendation 2**, in that a target-based compensation approach may enable aspirations for Country to be aligned with targets for biocultural values. A target-based compensation protocol may help to reduce net losses that arise from development projects (as is the case with existing offset approaches by design), thereby alleviating a key contributor to cumulative impacts.

To enable and operationalise these recommendations (noting these are variously in place or under development already) requires key questions to be addressed. We conclude this report by setting out a range of questions that should be the focus of further research and engagement, such that IA in northern Australia is fit-for-purpose and delivers outcomes that align with the aspirations of local people, and the commitments to biodiversity conservation that we as a nation have made.

- **Question 1:** What represents an appropriate and feasible set of targets for biodiversity, including species/ecosystems with biocultural value, in northern Australia, and how should these targets be developed?
- **Question 2:** How can decisions be harmonised across multiple scales, whereby (bottom-up) community-level targets (and plans) are aligned with top-down jurisdictional targets?
- **Question 3:** At what spatial scale should regional planning endeavours be conducted at?
 - Who “owns” and who “uses” these processes to make decisions at different scales must be central to addressing question such as 2 and 3, above.

- **Question 4:** What role can spatial planning (e.g., Development by Design) play in enhancing landscape-level outcomes under future development scenarios where there is a target-based framing?
- **Question 5:** To what extent can losses and gains of biodiversity be feasibly traded across landscapes, accounting for ecological constraints and cultural considerations (heterogeneous value sets)?

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Further information:

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