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Marlene de Witt

Jenny Pope
Edith Cowan University

Francois Retief

Alan Bond

Angus Morrison-Saunders
Edith Cowan University

See next page for additional authors

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Authors

Marlene de Witt, Jenny Pope, Francois Retief, Alan Bond, Angus Morrison-Saunders, and Carli Steenkamp

Biodiversity offsets in environmental impact assessment: Getting the timing right

Marlene de Witt^{a,b}

*Jenny Pope^{c,d,e}

Francois Retief^e

Alan Bond^{e,f}

Angus Morrison-Saunders^{c,e}

Carli Steenkamp^a

*Corresponding author

a. Department of Geography and Environmental Sciences
North-West University

b. Stellenbosch University Water Institute (present address)
Stellenbosch University,
South Africa

c. School of Science
Edith Cowan University

d. Integral Sustainability

e. Research Unit for Environmental Science and Management
North-West University

f. School of Environmental Sciences
University of East Anglia
United Kingdom

Biodiversity offsets in EIA: Getting the timing right

Abstract

Major developments can result in significant impacts on biodiversity which the mandated process of environmental impact assessment (EIA) aims to mitigate. There has been a recent move towards the application of biodiversity offsets as a last-resort, compensatory measure when options at the earlier stages in the mitigation hierarchy of avoidance, minimisation and restoration have been exhausted. Guidance on biodiversity offset planning available in different jurisdictions, however, demonstrates a lack of consensus about when biodiversity offsets should be formally introduced into the EIA process, and previous research has highlighted the perceived risks associated with commencing detailed offset planning too early as well as too late. Here we explore the implications of how and when offset considerations are introduced within EIA. We do this by reviewing and synthesising best practice principles for biodiversity offsets from the international literature, and then exploring how and when offsets were considered in a number of case studies that draw on documentary analysis and interviews with key role players. Our case studies are based in South Africa where regional guidance on offsets exists, supporting a body of practice. The research finds that the timing of involvement of biodiversity specialists is critical in determining whether considering offsets early will reap the combined benefits of: transparency and stakeholder engagement; guaranteeing the offset before development commences; and offset enforceability without jeopardising adherence to the mitigation hierarchy. Bypassing the mitigation hierarchy was perceived as allowing proponents to 'buy' approvals for developments that might otherwise be found unacceptable, although there was no evidence for this in any of the case studies evaluated. Although some of our findings may be specific to the South African context, the approach taken using international best practice principles for biodiversity offsets as a benchmark can equally be applied to evaluate practice in other EIA systems. We confirm the utility of this approach by evaluating the recently released South African *Draft National Biodiversity Offset Policy* for its potential to support best practice biodiversity offsets in EIA.

Keywords: biodiversity offsets, environmental impact assessment (EIA), mitigation hierarchy, South Africa

Biodiversity offsets in EIA: Getting the timing right

1. Introduction

Over the past few decades, biodiversity loss has been occurring at an “unprecedented” and “alarming” rate (Scholes and Biggs, 2005, p434). Activities such as agriculture, infrastructure, housing and industrial development, amongst others, can require land clearance, which causes habitat destruction, fragmentation, disturbance of ecosystems and species loss (Gibbons and Lindenmayer, 2007; Maron et al., 2010; Scholes and Biggs, 2005; Steffen et al., 2015). Many development activities are subject to environmental impact assessment (EIA) which has become an important tool for mainstreaming biodiversity considerations into development decision-making (Brownlie et al., 2013; Retief et al., 2011). However, development almost always leads to some residual biodiversity loss. This may be deemed acceptable on a case-by-case basis, but still potentially contributes to unacceptable biodiversity loss cumulatively (Bigard et al., 2017), the so-called ‘death by a thousand cuts’.

The concept of ‘biodiversity offsets’ has emerged over the last 25 years as a means of delivering a form of compensation for biodiversity loss with an overall outcome of ‘no net loss’ or even ‘net gain’ from development (Brownlie et al., 2013; Rajvanshi et al., 2011). Biodiversity offsets, or alternatively ‘biodiversity compensation’, ‘net conservation benefit’, ‘ecological compensation’, ‘environmental compensation’, ‘compensatory habitats’, ‘net conservation benefits’, amongst other terms (Bull et al., 2013; Middle and Middle, 2010; Quintero and Mathur, 2011), can take many forms. These include direct compensation in the form of restoration, rehabilitation and re-establishment of eco-systems, acquiring land for conservation, physical protection, or the removal of threats (such as vermin) to biodiversity, as well as indirect compensation, for example in the form of education, research or contributions to biodiversity funds (EPA, 2006; Madsen et al., 2010). Having continued to grow in popularity (Gibbons and Lindenmayer, 2007; Maron et al., 2012), offsets particularly gained traction when the Business and Biodiversity Offsets Programme (BBOP) was established in 2004 as an international collaboration of companies, government institutions and other organisations, and published the now widely read and cited paper *Biodiversity Offsets: Views, Experience, and the Business Case* (Ten Kate et al., 2004) (260 Google Scholar citations at June 2018).

Increasingly, the process of planning offsets in order to compensate for the negative impacts of development is being integrated within the process of environmental impact assessment (EIA), where offsets represent a ‘last resort’ when options at the earlier stages in the mitigation hierarchy of avoidance, minimisation and restoration have been exhausted (BBOP, 2009; Rundcrantz and Skärbäck, 2003). For the purposes of this paper, we define EIA to include the following stages: screening, scoping, baseline studies, impact prediction, mitigation, preparation of report, follow-up and monitoring, i.e. including activities occurring post approval decision (Morrison-Saunders, 2018; BBOP, 2009). The wide uptake of offsets as part of EIA can be attributed to the belief that they serve to reduce the number of difficult trade-off decisions between development and environment that competent authorities face during EIAs and supporting the achievement of sustainable development outcomes (e.g. BBOP, 2009; Bedward et al., 2009; Brown et al., 2014; Cowell, 1997; Kiesecker et al., 2010).

Designing and implementing effective offsets is a challenging task (May et al., 2017). It requires good data, good planning, and financial support and considerable time; as Brownlie et al. (2017, p252), note: *“The time required to design and implement an offset is often underestimated by the competent authorities and developers. The planning steps and agreements required prior to implementation can be complex: securing protected area status for an offset site can take years”*. The integration of offsets planning within the EIA process may help to ensure that the costs of implementing the offset are appropriately identified and incorporated into the development budget (BBOP, 2009). There is, however, little consensus on the appropriate timing for the formal introduction of offsets into the EIA process, as a comparison of international biodiversity offsets guidance documents demonstrates. For example the regulator’s guidance in Western Australia at the time of the research by Hayes and Morrison-Saunders (2007) specified that *“If offsets are proposed, these should be described in the referral documentation”*¹ (EPA, 2007, p18), i.e. at the very beginning of the EIA process. This guidance and its implications were a key cause of the concerns raised by practitioners in the Hayes and Morrison-Saunders (2007) research. Interestingly, the offsets guidance at the Federal level in Australia that was applicable at a similar time reflects the opposite approach, stating that the Federal legislation *“does not allow for offsets to be considered at the referral stage”* (SEWPaC, 2012, p11). It goes on to explain that this is because it is necessary to fully understand the baseline environment; the potential impacts of the proposal; and the residual impacts after options to avoid, minimise and rectify have been applied before offsets can be considered. The current Western Australian guidelines are different again, stating:

Offsets are the final step in the mitigation hierarchy and are only applied as a last resort after other avoidance and mitigation measures have been considered. Therefore discussion of the mitigation hierarchy would begin at project scoping stage (Government of Western Australia, 2014, p25).

It therefore seems that there is little consensus on the most appropriate point of formal introduction of offsets into the EIA process. Regardless of the wording of applicable guidelines, proponents are of course able to begin considering the need for biodiversity offsets as early as they like in the EIA process, or even before formal EIA commences, that is, in the ‘pre-application stage’. Consideration of offsets may range from a desktop exercise drawing on available biodiversity data to identify whether or not offsets are likely to be required, through to more substantial planning of offset proposals. It seems reasonable to assume that the timing of the introduction of offsets into the EIA process, and the level of planning undertaken at different stages of the process will have implications for the successful delivery of the offset, and potentially for the EIA process itself. We therefore ask:

What are the implications of how and when offsets are introduced into EIA with respect to the principles of best practice biodiversity offsets?

This paper explores this question in the context of EIA in South Africa. South Africa is a developing country where socio-economic development is paramount, but which is also blessed with extraordinary biodiversity (Cadman et al., 2010). While offsets have been applied within the EIA systems

¹ The referral process in Western Australia is part of screening i.e. the proponent refers information about the proposed development to the regulator for the purpose of determining whether or not formal EIA is required.

in South Africa for some years, until recently guidance has been limited and inconsistently applied (Brownlie et al., 2017). This has resulted in both a relatively low uptake of offsets in relation to the number of EIAs conducted (Lukey et al., 2017) and considerable variety of practice with respect to the point at which offsets are introduced to the EIA process. This situation provides the opportunity to explore how the timing of offset decision-making has affected the outcomes in a diverse selection of these case studies.

In March 2017, however, after this research was conducted, the South African Department of Environmental Affairs (DEA) released a *Draft National Biodiversity Offset Policy* (DEA, 2017). The objective of this policy is to standardise the use of biodiversity offsets in the country and to ensure that offsets are used in a more structured and consistent manner across different provincial environmental authorities. The policy also encourages provincial authorities to draft more refined and context specific provincial biodiversity offset guidelines to supplement the national policy document in terms of providing more detailed guidance on issues specifically related to that province.

The release of the draft Policy therefore also provided an opportunity to ask a second question, namely:

To what extent does the South African Draft National Biodiversity Offset Policy address issues associated with timing?

Section 2 provides a brief overview of the South African EIA systems that is necessary for understanding the case studies and the research methodology. Section 3 then outlines our research methodology, including an overview of the selected case studies. In Section 4 we draw on the literature firstly to review and summarise the principles of best practice biodiversity offsets which provide the structure for our analysis, and then to review existing literature related to the timing of biodiversity offsets in the context of these principles. We present our results and discussion with respect to our two research questions in Section 5 before drawing conclusions in Section 6.

2. South African context

EIA has been conducted in South Africa since the 1970s, albeit initially on a voluntary basis (Sowman et al., 1995). EIA was first legally mandated in 1989 through the Environment Conservation Act (ECA) (Act 73 of 1989). However, the first EIA Regulations introduced under the ECA were only enacted in 1997. Following the drafting of the new Constitution of South Africa in 1996, which enshrines the country's so-called 'environmental right' in Section 24, the National Environmental Management Act (NEMA) was promulgated in 1998 (NEMA, Act 107 of 1998) to give effect to the environmental right and to South Africa's international commitments to environmental protection. Sections 23 and 24 of NEMA outline the mandate for EIA as a decision making instrument for sustainable development. In 2006, EIA Regulations were published for the first time under NEMA to officially replace the ECA EIA Regulations. The 2006 Regulations were updated and revised in 2010 and again in 2014 and 2017. It is important to note that the timeframe for approvals of development applications subject to EIA is currently set in legislation at 300 days in South Africa. The timeframe starts with the formal registration of the project with the environmental authority and ends with a final decision by them. Specific timeframes are prescribed within this 300-day period for both the developer to submit documentation, public to comment (typically 30 days) and for the environmental authority to review

and make decisions. (For a comprehensive discussion of the prescribed timeframes and evolution of EIA regulations in South Africa, refer to Kidd et al., 2018). Because this 300-day prescribed timeframe can prove very tight for complex projects, some actions are typically completed by the developer and their EIA consultants before formal registration with the environmental authority, such as certain specialist studies and/or initial public participation. This in turn can have implications for how and when offsets are treated within EIA in South Africa, which may or may not apply in other jurisdictions.

Although the EIA system in South Africa is very comparable with international practice around mitigation and the application of the mitigation hierarchy (including offsets), as well as with procedural steps described in the previous section, the following points of clarification are provided on certain unique features to ensure a proper understanding of the subsequent discussion:

- the 'competent authority' deciding on and approving EIA in South Africa, by issuing a so-called 'environmental authorisation' (EA), is prescribed in NEMA to be either national or provincial government (of which there are nine). National government is represented by the National Department of Environmental Affairs (DEA) which authorises projects that have national significance crossing provincial and/or international borders. All other projects are authorised by one of the nine provincial authorities;
- although the approval documentation is legally termed an EA, under the ECA regime (up until 2006) the approval was termed a 'record of decision' (ROD). In this paper the term 'authorisation' will be used to cover both legal regimes;
- EIA consultants are defined in NEMA as Environmental Assessment Practitioners (EAPs) i.e. those responsible for conducting the EIA. A unique feature of the South African system is that EAPs need to be independent and formally declare that they have no vested interest in projects they assess;
- the EAP is responsible for commissioning specialists to investigate potentially significant impacts (e.g. on biodiversity, wetlands, heritage, etc.) and compiling the outcomes of these studies into an Environmental Impact Report (EIR). Specialist reports are submitted as appendices to the EIR to the competent authority. If biodiversity offsets are required, then a biodiversity offset report will be one such specialist report;
- Although offsets are not specifically prescribed in NEMA, draft national policy and guidelines have been developed to inform practice around offsets as a mitigation option. It could be that the draft policy might in future translate to specific offsets legislation.

Formally adopted provincial guidelines for biodiversity offsets are available for two of the nine Provinces: for the Western Cape (DEADP, 2007; later replaced by DEADP, 2011) and KwaZulu-Natal (Ezemvelo KZN Wildlife, 2013). Gauteng guidelines have been drafted, but have not been published (Brownlie et al., 2017). Anecdotal evidence suggests that these guidelines are used more broadly by other smaller provinces (in terms of population and administrative capacity) such as the Northern Cape and Free State. They are all based on international best practice principles and therefore are comparable. Importantly in terms of timing they all recommend the consideration of offsets after the significance of impacts has

been identified in the EIA process, for example: *“The trigger for considering a biodiversity offset is the significance of residual negative impacts on biodiversity”* (DEADP, 2011, p41).

While this could be interpreted to mean that consideration of offsets should not commence until options for avoiding, minimising and restoring impacts have been resolved and the residual impact assessed, the guidelines also recognise that it may be possible to ‘anticipate’ or identify the need for an offset at the outset of an EIA for some developments whose residual impacts can be reasonably accurately estimated prior to the completion of specialist studies. This is certainly possible in contexts such as South Africa where existing biodiversity plans provide much of the information required for this preliminary assessment. The guidelines clearly state, however, that the offset should only be proposed to the competent authority after completion of the specialist studies and full application of the mitigation hierarchy has been demonstrated. The detailed offset report should then be submitted with the final EIR (DEADP, 2011; Ezemvelo KZN Wildlife, 2013).

3. Methodology

The research explored the implications of the timing of the introduction of biodiversity offsets through a case study approach. The research steps are outlined below.

3.1. Literature review

Our first step was to review and synthesise the principles of best practice biodiversity offsets. To this end, we reviewed a selection of international biodiversity offsets guidance documents; identified the best practice principles within each reviewed document; and selecting those that featured in the majority of guidance documents (Section 4.1). This approach of establishing principles for subsequent application to practice mirrors the methodology of Fournier (1995).

We then reviewed existing literature related to the timing of biodiversity offsets in the context of these principles (Section 4.2).

3.2. Case study selection

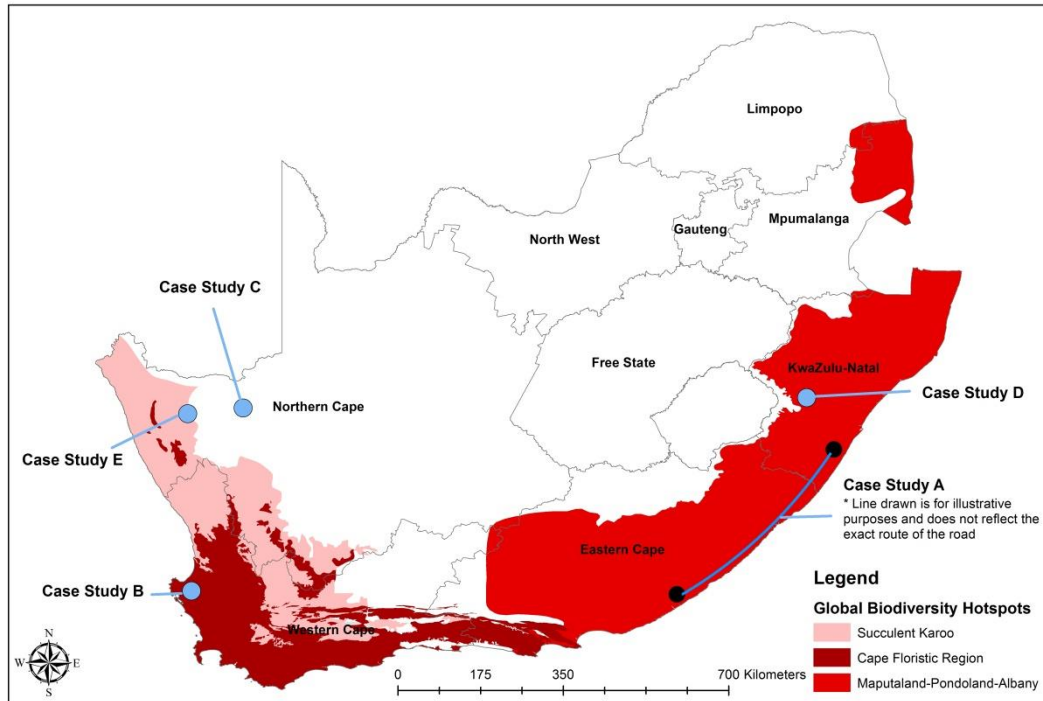
Case studies were purposefully identified to reflect a range of possibilities with respect to the timing of the consideration of offsets within the EIA process. This was done so that the implications of different approaches could be compared. The number of case studies to select is always a difficult task. However, this research supports the view of Eisenhardt (2002, p27) who argues that “a number between 4 and 10 cases usually works well”. Nine case studies were initially identified, but four were subsequently rejected due to a lack of publically available information and/or unwillingness on the part of key players to be interviewed. The five case studies ultimately selected were:

- Case study A: Construction of a road in the Eastern Cape and KwaZulu-Natal provinces
- Case study B: Construction of a cement plant and associated infrastructure in the Western Cape
- Case study C: Construction of a zinc mine and associated infrastructure in the Northern Cape
- Case study D: Construction of a transfer scheme and dam in KwaZulu-Natal
- Case study E: Construction of a wind energy facility in the Northern Cape

These five case studies represent a broad geographic spectrum as shown in Figure 1; each has unique and interesting features with respect to the timing of offsets; and sufficient data were available to enable the development of a rich understanding of each case within its context. The generalisation from the case study data relies on so-called ‘replication logic’ and not ‘sampling logic’

as explained by Yin (2003). The results are therefore expected to replicate under similar conditions and within similar contexts, and do not serve to produce broad generalisations as in a representative sample or statistical sense. The latter understanding is commonly accepted as a valid way of generalising from case study research (Maxwell, 2002).

Figure 1: Case study locations in context of Global Biodiversity Hotspots



3.3. Case study analysis

The key documents for each of the five case studies were reviewed (final EIR, authorisation documentation and offset report in cases where they were prepared as part of the EIA) to obtain the background information on the cases; reasons why an offset was recommended; how and when the offset was introduced; and details of the offset in the authorisation.

This documentary review process was supplemented with interviews in order to obtain a deeper understanding of the issues, and to be able to provide insight on causal inferences (Yin, 2003). All interviews were conducted in semi-structured, conversation style which enabled the gathering of additional information and insights. Interviews were conducted anonymously in line with ethical practice. An effort was made to interview at least three people involved in each case study, representing different roles – the project proponent (PP), EAP (and/or specialist) involved with the offset, and competent authority (CA). In some cases there was more than one person in each role, and since there are relatively few people involved in offsets in South Africa, it was inevitable that some people interviewed were involved in more than one of the case studies featured in this research. In total we interviewed 11 individuals in 17 roles across the five case studies, as indicated by the numbering system in Table 1.

Table 1: Interviewees

Case studies	Project proponent (PP)	Specialists (EAP)	Competent Authority (CA)
A	PP1	EAP1, EAP2	CA1
B	PP2	EAP 2, EAP3	CA2
C	PP3	EAP1, EAP2	
D	PP4	EAP2, EAP4	CA1
E	PP5	EAP1	

Interviewees were asked:

- To critique the offset they worked on against the best practice principles identified in the literature review, with a particular emphasis on how the timing of the introduction of the offset affected performance; and
- To reflect more generally on the implications of the timing of biodiversity offset planning in South Africa.

The data from the documentary analysis and interviews were used to develop a synopsis of each case study, summarising when offsets were introduced in each case and how the timing affected the best practice principles in each case. This enabled us to reflect on the implications of offset timing for the best practice principles more generally (Section 5.1). In some cases interviewees raised issues pertinent to one principle in the process of addressing another; for this reason some additional coding was undertaken to align the data with the principles.

3.4. Review of the South African *Draft National Biodiversity Offset Policy*

In order to answer our second research question - *To what extent does the South African Draft National Biodiversity Offset Policy address issues associated with timing?* – we reviewed the draft policy in light of the findings of our case study analysis. The draft policy recognises the shortcomings in the use of offsets to date and echoes some of the concerns already mentioned about the potential for inappropriate use of biodiversity offsets:

“Unless their (offsets’) use is strictly controlled, they could be used as leverage to obtain authorisation for listed activities in cases where offsets should not be considered, resulting in loss of critical biodiversity” (DEA, 2017, p1).

“Without a clear and explicit policy on the use of biodiversity offsets it is likely that biodiversity and ecological functioning will be lost, rural communities’ livelihoods endangered and that offsets will continue to be used inconsistently, inappropriately and ineffectively as a tool purportedly to benefit the conservation of biodiversity and ecosystem services and pursue sustainable development.” (DEA, 2017, p5, emphasis added).

We evaluated the extent to which we believe the draft policy will achieve its aims to provide a clear basis for the use of offsets to protect against biodiversity loss. Specifically, we assessed the extent to which we believe the new policy will effectively support adherence with the best practice principles that we identified to be potentially affected by the timing of consideration of offsets within EIA.

4. Literature review

4.1. Principles of best practice biodiversity offsets

We reviewed the principles of best practice biodiversity offsets as documented in 11 biodiversity offset guidance documents, together with a legislative review paper that provided additional international perspectives. The guidance documents included the internationally recognised BBOP Principles, guidance from South Africa (the context for our research), New Zealand, and also different jurisdictions within Australia, which has well-established systems of offsets, either as part of EIA or through other conservation and land management systems (Madsen et al., 2010; Middle and Middle, 2010). While similar in intent and purpose, the offset guidance differed in approach and layout, but typically identified key principles that should be upheld. These varied in number and degree of detail. A summary of our analysis is provided in Table 2 below, which shows the 12 most widely accepted principles in the documents we reviewed, with numbers indicating the page in the source document in which the principle was discussed and shaded boxes meaning that the principle was not explicitly discussed in that document. The order reflects their importance, judged by the number of documents in which they appeared.

Table 2: Review of best practice principles for biodiversity offsets

Source document												
Principle	IUCN Policy on biodiversity offsets (IUCN, 2016)	BBOP Offset Design Handbook (BBOP, 2012)	IFC Performance Standard 6 (IFC, 2012)	EPA Western Australia (EPA, 2006)	New South Wales (Government of NSW, 2014)	New Zealand Dept of Conservation (Gardner and von Hase, 2012)	A review of selected legislative frameworks (McKenney, 2005)	NZ assessment framework (Norton, 2009)	Wetland offset guideline for SA (Macfarlane et al. 2016)	KZN biodiversity offset guidelines (Ezemvelo KZN Wildlife, 2013)	Western Cape Offset guideline (DEADP, 2011)	Draft National Biodiversity Offsets Policy (DEA, 2017)
1. Adherence to mitigation hierarchy	(p3)	(p10)	(p2)	(p8)	(p10)	(p3)	(p14)	(p702)	(p7)	(p10)	(p14)	(p6)
2. No net loss	(p3)	(p10)	(p4)	(p11)		(p4)	(pii)	Not specifically mentioned in principles, but the principles are based on the goal to achieve no net loss or a net gain.	(p7)	(p2)	(p15)	(p6)
3. Long-term outcome (offset should last as long as residual impact)	(p3)	(p10)		(p12)	(p12)	(p3)	(pv)		(p7)	(p5)	(p15)	(p7)
4. Transparency & stakeholder participation	(p3)	(p10)		(p12)	(p10)	(p4)			(p8)	(p)	(p15)	(p7)

5. Offset follows landscape & ecosystem approach	(p3)	(p10)	(p2)			(p6)	(p62)		(p7)	(p3)	(p15)	(p6)
6. Limits to what can be offset	(p3)	(p10)				(p10)		(p702)	(p7)	(p3)	(p14)	(p6)
7. Additionality, net gain or additional conservation outcomes	(p3)				(p11)		(piv)		(p7)	(p3)	(p14)	(p7)
8. Like for like, or equivalent exchange			(p2)	(p10)	(p10)	(p3)			(p7)	(p2)	(p15)	(p7)
9. Offset should be in place before activity starts						(p12)	(p40)	(p702)	(p12)	(p3)	(p1)	(p7)
10. Offset is enforceable & auditable (i.e. documented in sufficient detail)	(p3)			(p12)	(p12)		(pv)		(p8)	(p3)	(p15)	(p8)
11. Cumulative, direct and indirect impacts are considered	(p3)			(p8)		(p6)			(p6)	(p4)	(p15)	(p6)
12. Precautionary principle	(p3)	(p64)		(p61)		(p31)			(p15)	(p4)	(p15)	(p7)

*Principles 9 and 10, although similar, are considered separately here as they cover two equally important points: Principle 9 requires that the competent authority must approve the offset before the project activities start, and ideally the offset implementation should start before the project activities. Principle 10 requires that the offset and its conditions should be written in a way that is clear and defensible in court.

Some of these principles are primarily concerned with the substantive biodiversity outcomes to be achieved (2, 3, 5, 7 and 8), corresponding to the 'environmental improvement' category of biodiversity offset concerns highlighted by Lukey et al. (2017). Much has been written on the extent to which these goals are being met in practice (Maron et al., 2016; Maron et al., 2012; May et al., 2017), and how biodiversity outcomes from offsets initiatives can be improved (for example Pilgrim et al., 2013). Other principles are more process- or governance-oriented, and therefore directly relevant to EIA (Principles 1, 4, 6, 9, 10 and 11, 12). The review of existing literature in the following section explores how the timing of offsets can affect performance against these best practice principles, and in some cases highlights how process/governance considerations can affect substantive outcomes.

4.2. Previous research on the implications of timing for the best practice principles

Despite the arguments for the early commencement of detailed offsets planning, a number of researchers have expressed concern that investing significantly in offsets planning too early within the EIA process (e.g. at the screening or scoping stage) can discourage adherence to the mitigation hierarchy (Principle 1). They argue that in such cases offsets may be perceived as an attractive short-cut by proponents unwilling to meaningfully explore options to avoid, minimise and rectify negative impacts (Apostolopoulou and Adams, 2017; Hayes and Morrison-Saunders, 2007; Middle and Middle, 2010; von Hase and ten Kate, 2016), a concern that is also expressed by BBOP (2009). Phalan et al. (2017) suggest, however, that this apparent enthusiasm for offsets reflects naivety about the real challenges associated with their development and implementation (pp5-6):

Unrealistic assumptions about the capacity and cost of restoration and offsetting could result in promises of remediation being a more attractive option for companies than avoiding impacts early in the project cycle.

The inference is that it is difficult in practice for proponents to meaningfully apply the mitigation hierarchy whilst also considering and planning for offsets. Although Brownlie et al. (2017) argue strongly that adherence to the mitigation hierarchy is not inconsistent with the early commencement of offsets planning if the latter is undertaken iteratively as an integral part of the EIA process, the literature does reflect an uneasy relationship between these two objectives.

A failure to adhere to the mitigation hierarchy can also have implications for the achievement of other best practice principles for biodiversity offsets; for example Bigard et al. (2017) suggest it can contribute to a failure to achieve no net loss (Principle 2) since “*biodiversity conservation occurs in a world where there is a background of generalised ‘net loss’*” (p41). In their research in Western Australia, Hayes and Morrison-Saunders (2007) found that proposing offsets too early, e.g. at the proposal referral stage, could lead to offsets being used to legitimise unacceptable developments (i.e. to ‘buy’ approvals), since insufficient information would be available on either the level of residual risk or the nature of the environmental assets to which these risks applied. Given that the EPA (2007) guidelines stated that offsets would not be considered acceptable in the event of significant residual impacts on ‘critical’ (i.e. the most valuable) environmental assets, an early proposal of offsets could thus violate the principle of limits to what can be offset (Principle 6). This makes the determination of limits of acceptability crucial to the consideration of offsets within EIA (see also Norton, 2009; Pilgrim et al., 2013).

Researching in New Zealand, Brown et al. (2013) explored the relationship between offsets timing and compliance, which is related to the need for offsets to be guaranteed before the activity starts (Principle 9) and the principle of enforceability (Principle 10). They found that:

“Where compensation requirements were mentioned early in the process, and presumably better integrated into project planning, including timelines, eventual levels of compliance are higher. The data indicates (sic) that compliance is more likely to be achieved if the full scope and nature of activities are determined by the time of granting consent” (Brown et al., 2013, p42).

In summary the literature suggests that there is a tension between the need to start early with offsets planning and the risk of deciding too early on offsets as an acceptable strategy before adequate information is available to justify such a decision.

5 Results and discussion

5.1 Case study analysis

The results of the case study analysis are presented in Table 3. The first column describes the case study, the second describes how and when the offset was introduced within the EIA process, and the third summarises the views raised by the people interviewed for each case in relation to the best practice principles for biodiversity offsets.

Table 3: Summary of case study analysis

CASE STUDY	HOW AND WHEN OFFSET INTRODUCED (DOCUMENT REVIEW)	IMPLICATIONS FOR BEST PRACTICE PRINCIPLES (INTERVIEWS)
A: Construction of a road in the Eastern Cape and KwaZulu-Natal provinces		
<p>The construction of a road was approved based on the positive socio-economic benefits outweighing the potential negative environmental impact (CCA Environmental, 2009). Due to the fact that stretches of the road would be built in the Maputaland-Pondoland biodiversity hotspot and threaten endemic Pondoland Sandstone Coastal Sourveld, the final approval included a condition for an offset (DEA, 2010).</p>	<p>At end of EIA, just before submission of EIR</p> <p>The need for an offset was introduced in the final EIR and then as a condition in the final authorisation to compensate for “potential significant residual negative impacts” and “uncertainties” associated with cumulative impacts of the project (DEA, 2010, p12).</p> <p>Authorisation conditions included:</p> <ul style="list-style-type: none"> • “Negotiate and sign an offset agreement with the competent authority and other relevant role players”; • Submit a detailed report of the proposed offset; • “Employ a botanist for search and rescue of species and draw up a rescue and rehabilitation plan” (DEA, 2010). 	<p>Principle 1: The offset study was only done after the EIA was finalised, therefore the offset specialists could not significantly contribute to further avoidance, mitigation and minimisation measures.</p> <p>Principle 4: Although most interviewees noted that many stakeholders were provided the opportunity to contribute to the offset design, since the offset study was not part of the EIA it was not subject to the same public participation standards as the EIA process.</p> <p>Principle 9: Having the offset as an “afterthought of the EIA process”, as stated by one interviewee, with no clear required next steps, has contributed to disputes that are still ongoing. As such the road – which was proposed a decade ago – is still not built.</p> <p>Principle 10: The authorisation only states that an offset must be negotiated; no detailed process is outlined, making enforcement and implementation very difficult.</p>
B: Construction of a cement plant, quarries and associated infrastructure in the Western Cape		
<p>An application for cement mining and processing was initially rejected</p>	<p>After rejection of first EIA. Part of second EIA from the outset.</p>	<p>Principle 1:</p>

<p>based on the overlap of the project area with endangered vegetation types, as found by the botanical specialist. A more detailed analysis which was done as part of the offset study revealed that the project will only affect vulnerable vegetation, making an offset a feasible option. The application with an offset was approved (Von Hase and Brownlie, 2014, unpublished).</p>	<p>Various avoidance and mitigation measures were followed in the offset design and the residual impact on the endangered and vulnerable vegetation was reduced (Von Hase and Brownlie, 2014, unpublished, p15).</p> <p>The second EIA application containing an offset report as an addendum was authorised, with the condition that the offset report must be implemented i) within one year of construction commencing and ii) that a nature reserve be established (DEADP, 2015, unpublished). The authorisation only refers to the offset report attached as an addendum to the EIR and does not specifically refer to the offset conditions.</p>	<p>All interviewees were in agreement that the mitigation hierarchy was properly followed in the second EIA, because the offset specialists could change the project design and implement supplementary avoidance, minimisation and restoration measures to reduce the offset requirement to a minimum, in parallel with the EIA.</p> <p>Principle 4: The timing of the offset allowed a transparent process in offset design.</p> <p>Principle 10: Introducing the offset before approval was given for the EIA allowed specific offset conditions to be known to the authorities when drafting the authorisation, improving enforceability. However, all interviewees were of the opinion that the conditions should have been more detailed (it only referred to the offset report content).</p>
<p>C: Construction of a zinc mine and associated infrastructure in the Northern Cape Province</p>		
<p>The high biodiversity value of the site was well-known by the time this project proponent decided to pursue the project.</p> <p>The mitigation hierarchy was applied during the EIA process with the project proponent implementing numerous measures proposed by the specialists. However even after all these efforts, there was still residual loss in the form of the</p>	<p>Mid-EIA process after specialists exhausted mitigation hierarchy</p> <p>Although it was known from the pre-application phase that an offset may be a requirement based on existing knowledge of the site, an offset was only proposed after all the specialist studies have been done, the mitigation hierarchy had been exhausted, and the residual impacts found to be acceptable. The biodiversity offset study was commissioned to be done in parallel to the EIA process and the offset report was submitted with the final EIR (ERM, 2012).</p>	<p>Principle 1 Specialists were involved early on in the process and all parties interviewed confirmed that the project proponent continuously made changes to the mine’s design to meet the recommendations from the specialists. The offset specialists could “<i>go back and check if mitigation hierarchy has been applied, and could influence design</i>”.</p> <p>Principle 4: Since the offset report was submitted as part of the EIA, the offset process was as transparent and as subjected to public scrutiny as the EIA report itself. “<i>The timing played a huge role</i>”</p>

<p>actual mining pit, which could not be mitigated (Botha et al., 2013).</p>	<p>The offset requirements in the conditions of the authorisation span three pages. The number of hectares of each vegetation type that must be included in the protected area is specified (DENC, 2013).</p> <p>The conditions included i) the protection of the offset sites in perpetuity, ii) the signing of a legally binding agreement within one year of approval, iii) penalties for non-compliance and iv) commencement of activities only after the offset agreement is signed (DENC, 2013)</p>	<p><i>here – the concerns from stakeholders could be addressed and the design of the project could still be influenced.”</i></p> <p>Principle 9 The offset agreement and proper controls were in place well before the activity started.</p> <p>Principle 10: Introducing an offset after the specialist studies were conducted, but before submission of the EIA, <i>“helped to create a good quality offset and proper conditions for enforcement”</i>. Furthermore, the full costs of the offset were known by the developer throughout the process.</p>
<p>D: Construction of a water transfer system and dam in KwaZulu Natal Province</p>		
<p>Feasibility studies for construction of a transfer scheme and dam in KwaZulu-Natal started in 2000, further studies were conducted in 2004 and the final application was submitted in 2009 (INR, 2015).</p> <p>The dam was to be built in the Maputaland-Pondoland-Albany area of endemism, although a large area of the chosen site has been transformed into farmland and is extensively covered with alien invasive species (CES, 2013). Still, numerous significant environmental impacts were identified.</p>	<p>At authorisation phase, after submission of EIR</p> <p>The application was authorised in 2009 and after two unsuccessful appeals, construction started in 2011. According to all interviewees, the idea of an offset was introduced late in the EIA process and formally included only in the conditions of approval.</p> <p>The conditions of approval required a “detailed plan of action” for both wetland and biodiversity loss. It made no mention of implementation or what the offset should be. Investigations into the offset requirements commenced in 2011, after construction of the dam had started (INR, 2015).</p>	<p>Principle 1: Because the offset was introduced only as a condition of approval, the offset study could not make improvements to the already approved plan. One interviewee noted that <i>“the principles of the mitigation hierarchy were considered in the preliminary studies before the EIA, but not to the appropriate extent”</i>.</p> <p>Principle 4: Even though the offset report was drafted long after the approval of the EIR, all interviewees confirmed that significant efforts were made to liaise with landowners and other interested parties in the offset design process – this allowed them to secure sites for the offset.</p> <p>Principle 6:</p>

	<p>The dam itself was built within a critical conservation area considered to be irreplaceable and residual impacts were severe and irreversible (INR, 2015).</p>	<p>The residual impacts were irreversible, therefore the principle of limits to what could be offset were not adhered to.</p> <p>Principle 9 Construction of the dam was completed in 2013 and the offset is not yet in place. Funding of the offset has been a major obstacle to finalisation and implementation. Due to the late introduction of the offset, costs could not be internalised.</p>
E: Wind Energy facility in Northern Cape		
<p>An international renewable energy company commenced with an EIA process in 2012 to construct a wind and solar energy facility on two farms in the Northern Cape Province. Amendments to the sites, size and design were made as part of the EIA specialist study recommendations. The final EIA report stated that the potential impacts of the plant, both during construction and operational phases, would be of medium to low significance should the proposed mitigation measures be implemented and that the “<i>benefits outweigh the negative environmental impacts</i>” (Aurecon, 2013, unpublished).</p>	<p>After submission of EIR, before authorisation.</p> <p>After the final EIA was submitted, authorities informed the project proponent that the application might be rejected, because a portion of the project falls within a critical biodiversity area, and another in the expansion plans of a nearby protected area.</p> <p>The site was reduced and an offset area adjacent to an existing nature reserve was agreed upon. The revised, downscaled application was approved on condition that the project proponent must i) purchase the identified land; ii) assist government with the purchasing of another piece of land for conservation; and iii) that an offset agreement be signed “ <i>... no later than when financial closure is reached for the proposed project</i>” (DEA, 2014, unpublished).</p> <p>Offset studies therefore only commenced after project authorisation.</p>	<p>Principle 1: Although a number of avoidance and mitigation measures were proposed in the EIA, it was said that the formal mitigation hierarchy only got introduced at the end of the EIA. The offset design process could have been studied and negotiated more in-depth if the issues were raised earlier in the EIA process.</p> <p>Principle 4: Because the offset was introduced after the entire EIA was completed, it was not part of the public participation process. The offset was also agreed upon before any studies were done. Stakeholders’ input could therefore only be included to a limited extent.</p> <p>Principle 9: The introduction of the offset right at the end of the EIA process clearly caught the project proponent by surprise and had significant cost implications for the project, making it difficult to guarantee the offset.</p> <p>Principle 10: Although the offset was introduced late, the offset site could be secured before authorisation and the conditions referring</p>

		to the offset were extensive enough to not raise concerns regarding enforceability.
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In three of the case studies analysed here the biodiversity offsets were only formally introduced at the authorisation stage (after submission of the EIR) as a surprise condition of approval (Case Studies A, D and E). In two cases they were introduced during EIA (before submission of the EIR) (Case Studies B and C). In no cases were they introduced at the pre-application stage.

The case study analysis found that the timing of the offset has an impact on the following best practice principles of biodiversity offsets in particular:

- Principle 1: Adherence to the mitigation hierarchy
- Principle 4: Transparency and stakeholder participation
- Principle 6: Limits to what can be offset
- Principle 9: Offset should be guaranteed before activity starts
- Principle 10: Offset is enforceable

Each of these is discussed below in the context of the case studies, followed by a summary of other issues raised more generally by interviewees.

Principle 1: Adherence to the mitigation hierarchy

All the offsets specialists interviewed raised the point that bringing them into the EIA process early (i.e. prior to the mitigation stage) enables them to contribute to all aspects of the EIA, including baseline studies and the application of the avoidance, minimisation, restoration and offsets stages of the mitigation hierarchy. The implication is that these steps may not be undertaken thoroughly by the EAP or other specialists without the offset specialist input, and that this issue may only become apparent at the point at which the offsets specialist becomes involved. The view expressed was that it is the offset specialists who tend to be the strongest advocates for applying the mitigation hierarchy, at least in the case studies examined. For Case Study B in particular, the EIA application was initially rejected, with the competent environmental authority specifically requesting that the proponent show more clearly how the mitigation hierarchy was applied (confirmed by four interviewees). For Cases B and D, the offset specialists were required to redo some of the baseline information that was gathered in the EIAs, in order to revisit the mitigation hierarchy before starting the offset design process.

A failure to fully adhere to the mitigation hierarchy potentially represents a missed opportunity for proponents. One interviewee for Case Study C echoed the views of Phalan et al. (2017) in relation to relative costs, stating that:

“the mitigation hierarchy reduces costs. It saves you buying the offset and managing it into perpetuity. Investing in the mitigation hierarchy is much cheaper in the long-term. It is a time bomb that can blast if not implemented properly.”

These findings also support research results from various studies exploring EIA report quality in South Africa that found dealing with alternatives and mitigation options as being a particular weakness (see for example Sandham et al., 2010; Sandham et al., 2008a; Sandham et al., 2008b). As previously discussed, failure to adhere to the mitigation hierarchy has also been identified in a number of international studies of EIA, in some cases arguably due to the perceived attractiveness of

offsets in comparison with impact avoidance, minimisation and repair options (Bigard et al., 2017; Hayes and Morrison-Saunders, 2007; Phalan et al., 2017).

Principle 4: Transparency and stakeholder participation

When the offset requirement is introduced when the EIA process has been essentially completed, for example as a 'surprise' requirement in the authorisation (as in Case Studies A, D and E), the offset report will only be drafted post decision, which means that it would not have been part of the official EIA public participation processes and therefore would not satisfy Principle 4. As Gibson (2013) points out, the public plays an important supporting role in scrutinising projects, picking up matters that government may have missed, and raising controversial issues that a government official may not be comfortable doing. In the South African context where extensive public participation is required for EIAs, it is problematic that offsets can escape this exercise simply based on when in the process the offset is introduced².

Principle 6: Limits to what can be offset

Case Study D reflects loss of irreplaceable biodiversity and hence a violation of Principle 6, although in this case this was not apparently related to timing. Our interviewees also raised the general concern that if detailed offsets planning commences too early, when specialist studies have not yet been undertaken and the mitigation hierarchy has not yet been applied, then there is a risk that offsets will be proposed and possibly accepted in cases in which there may be unacceptably high impacts on highly valued environments. This echoes concerns raised by Hayes and Morrison-Saunders (2007) about the potential for proponents to 'buy' approvals through inappropriate offset proposals that violate Principle 6. We did not find any evidence of this particular concern playing out in our case studies, however.

Principle 9: Offset should be guaranteed before the activity starts

In cases A and D, where the offset surfaced as a condition in the authorisation (or in response to the development application as was the case in Case Study E), the finalisation and implementation of the offsets have been dragging on for many years. A statement in the conditions of authorisation that "an offset must be investigated", does not secure the offset, as illustrated by Case Study D, where the dam is already in use, but the offset is still not in place.

If offsets are considered as part of the EIA process then offset costs can better be integrated into the project costs; as BBP (2009, p16) notes: "*The implementation of offsets in practice may well require land purchase or complex management agreements with landowners or communities. Integrating offset design with the EIA process may help to identify possible budget requirements early*". Conversely, if the offset is not secured in a timely fashion then costs to the proponent may escalate due to landowners increasing the price of suitable land for offsets, potentially even making the project unviable. Some may argue that the profitability of the proponent's operation is not relevant to the discussion. However, if escalated costs mean the proponent pulls out, the conservation gains

² Furthermore, if the offset report were drafted late in the EIA process (after the completion of public participation activities), and was subsequently used by the competent authority as basis for a decision, this would be procedurally unlawful and grounds for appeal. Government may not use any information in the EIA authorisation decision making that was not part of the public participation process process.

from the offset will be lost too. In Case Study B, the project has become only marginally profitable because of the long time it took to finalise the EIA and the offset proposal. In Case Study D, the dam is already built, but it took years to negotiate with landowners in the area to give up some of their land for stewardship agreements – land in this area has grown in value and, according to the persons interviewed, it became less and less likely over the years that farmers will be willing to enter stewardship agreements. Access to the right pieces of land is critical for the success of the offset (Quétier et al., 2014).

Principle 10: Offset is enforceable

Enforceability was a concern in the two cases (A and D) where offsets were introduced at the authorisation stage. In case E where the offset site was already secured and included in the conditions of approval, enforceability was not a big concern. If the offset study is not done before authorisation is granted, the conditions of the authorisations will not be specific enough to ensure proper implementation, a point previously raised by Brown et al. (2013). The following two comments from interviewees emphasise this point:

“As developers we want to go into construction with certainty. The offset study was only done after the authorisation, therefore there’s no quantification of measures that should be in the offset in the authorisation, and no guidelines on how to take this forward.”

“The conditions were... not detailed enough – it merely refers to the offset study; we would have wanted all the recommendations in the offset study actually in (the authorisation). It will definitely have an impact on the implementability of the offset... The offset is not nearly as enforceable as it should be.”

What the case studies have shown is that the already difficult task of implementing, monitoring and enforcing an offset is made almost impossible when the offset planning and design is dealt with post decision and separate from the actual project planning and design.

Other issues

Interviewees also raised concerns about the potential time/quality trade-off under the South African system: If detailed offsets planning commences at the beginning of the EIA process, it places significant time constraints on specialists and EAPs to conclude all studies and secure an offset site within the very strict set timeframes (i.e. 300-day period), impacting on the quality of work. This may be an issue in other jurisdictions and situations in which EIA is undertaken under time pressures for regulatory or other reasons. We note, however, that many South African practitioners feel the set timeframes are generally inadequate for conducting complex EIAs in sensitive socio-ecological environments³.

5.2 Review of the South African Draft National Biodiversity Offset Policy

The South African *Draft National Biodiversity Offset Policy* incorporates the best practice principles for biodiversity offsets identified in this paper. The draft policy is explicit about timing. It recommends that “the probable need for – and design of – offsets” be evaluated in the pre-

³ This view was expressed repeatedly at the IAIA South African affiliate conference 16-18 August 2017.

application stage of an EIA (DEA, 2017, pp12-13). The two key reasons given for considering offsets so early on are:

- 1) South Africa has significant biodiversity data available, including biodiversity plans for many regions, which makes it possible to predict whether an offset may be necessary. The policy encourages proponents to have pre-application meetings with the competent authorities to determine whether an offset study will be required for the proposed development (DEA, 2017. p.13); and
- 2) The 300-day timeframe for EIA processes necessitates the offset studies to be done in parallel with the other specialist studies – there will not be time to “adequately assess and evaluate” the offsets and apply the mitigation hierarchy if the offset is only introduced later in the process (DEA, 2017, p12).

Thus the policy directly addresses the concern about the timing/quality trade-off raised by interviewees in this research. In the remainder of this section we discuss how the policy upholds the five best practice principles for biodiversity offsets that relate most strongly to timing as identified through our case study analysis (1, 4, 6, 9 and 10).

1. Adherence to the mitigation hierarchy

The mitigation hierarchy is central to the policy, and it states on numerous occasions that the final report submitted for authorisation must clearly show how the mitigation hierarchy was used and exhausted. Should an offset be deemed appropriate by the competent environmental authority at the pre-application phase, the offset study should be completed in parallel with the EIA process, while the final submission, with the proposed offset, should clearly demonstrate how the mitigation hierarchy was followed (DEA, 2017, p13).

4. Transparency and stakeholder participation

By commencing offset planning during the EIA process, the offset report will be part of the documentation submitted for public participation.

6. Limits to what can be offset

As well as emphasising the requirements for adherence to the mitigation hierarchy, the policy also repeatedly states that offsets are not appropriate in circumstances where there is likely to be a very high residual risk.

Although it may be possible to anticipate the need for offsets as previously discussed, the residual impacts will only be confirmed after specialist studies have been undertaken and the mitigation hierarchy applied through the EIA process. If proponents commence detailed offset planning prior to this information being available, the proponent may carry an additional financial burden in investing in a specialist offset study since it could turn out that 1) there is a low residual risk, meaning an offset isn't actually required after all, or 2) the application may be deemed unacceptable due to an unexpectedly high residual impact.

Our research suggests that there are two main reasons why this situation could arise: firstly, given the tight timeframe within which EIA must be conducted in South Africa; to save time, proponents may commission an offset study if they think it might prove necessary but before this has been

confirmed; and secondly, some persons interviewed cited examples of authorities demanding offsets at the pre-application stage, before any meaningful consideration of their need has been undertaken. This second point alludes to a complicating factor in South Africa which is, as the policy itself explicitly recognises, that government capacity is limited (DEA, 2017, p10). Ideally, regulators would actively ensure that the information base on which decisions are taken involving biodiversity offsets is adequate; would insist upon thorough application of the mitigation hierarchy; and refer inadequate offset proposals back to proponents, but our research at least suggests that this is rarely the case. Without adequate human resources and knowledge within the regulatory agencies, offsets may still be misused in this way, despite the new policy, particularly if undue emphasis is placed on economic and social benefits.

9. Offset should be guaranteed before the activity starts

The policy requires that the offset site must be secured after authorisation, but before development commences. It also states that (DEA, 2017, p18):

“Suitable financial provision for meeting the needs of an offset may be required by the competent authority, prior to the issue of an environmental authorisation.”

These policy provisions make sense since it might take a long time to secure the offset site while the EIA process needs to be formally concluded. Moreover, requiring financial provision before a final decision is made increases the enforceability of the offset (see Principle 10 below).

10. Offset is enforceable

The policy contains two pages of guidelines on what the competent environmental authority could/should include in the authorisation to ensure that proper implementation will follow (DEA, 2017, pp20-21). The introduction of the offsets within the EIA process will enable officials to write detailed offset requirements into the authorisation conditions.

6. Conclusions

Our research is limited through a focus on just five case studies, although our detailed analysis has allowed a clear picture to be formed of the manner in which biodiversity offsets have been embedded in some South African practice. While there are some specific aspects of the South African context that influence offsets planning, particularly the 300 day timeframe within which EIA must be completed, the availability of biodiversity plans and other information that can inform early consideration of offsets, and concerns about the capacity of regulators, we believe that our findings may be generalizable in many respects, particularly to those jurisdictions where some or all of these elements also apply. This view is supported by the fact that our research has confirmed findings from similar research, conducted in other parts of the world, that how and when offsets are introduced into the EIA process has implications for the achievement of best practice biodiversity offsets. Furthermore, the best practice principles for biodiversity offsets reviewed and synthesised here are internationally relevant and can ask as a benchmark against which to evaluate practice in other EIA systems.

If the potential requirements for offsets are discussed with regulators at the screening or pre-application stage, based upon existing knowledge of the baseline environment, then then any likely need for offsets can be identified early, enabling the proponent to make an informed decision about whether or not to commence detailed offset planning. This may offer the advantage of streamlining the time taken to conduct EIA (particularly relevant in South Africa given the 300 day limit); enabling offsets specialists to assist in other biodiversity-related aspects of the EIA, including baseline studies; supporting adherence to the mitigation hierarchy; ensuring that the offsets proposal goes through the public participation process; enabling the costs of the offsets to be fully internalised by the proponent; and enabling the offsets to be included in environmental authorisations and thus enforced.

There may be a disadvantage to the proponent of over-investing in detailed offsets planning early, since the EIA could find that residual risks to valued environments remain too high after the application of the mitigation hierarchy for offsets to be considered a valid option. In such cases the proposal should be found unacceptable, in which case the cost of the offsets study as well as the costs of the EIA will have been wasted by the proponent. It might however be argued that spending money to find out a project is unviable is more cost effective than implementing an unacceptable project – therefore money well spent in the end. And as highlighted before, the financial risks can be mitigated through a preliminary assessment of likely risks to biodiversity values, using information already available such as biodiversity plans. The other side of this scenario is, however, of greater concern: practitioners interviewed in our research, in agreement with reported findings of previous studies discussed in Section 4.2, have expressed concern that commencing detailed offsets planning early (i.e. at the screening or scoping stage of an EIA) could mean that adherence to the mitigation hierarchy is compromised, since a high profile offset initiative may be more appealing to the proponents and also possibly the regulator with conservation objectives, than efforts to avoid, minimise and restore impacts. This in turn could lead to developments being approved that have unacceptably high residual risks, in which case proponents are perceived to be ‘buying’ approvals. None of our case studies demonstrated this concern playing out in reality but it is interesting to note that it is held by practitioners in South Africa as well as in other parts of the world.

A significant finding from our research is that while good EIA practice would require good baseline studies and robust application of the mitigation hierarchy regardless of how, whether or when offsets are planned, the experience of those interviewed for this research was that in practice it is often the offset specialist who ensures that these fundamentals are in place. The real issue is therefore less about how and when offsets are introduced to the EIA process, and more about the timing of the involvement of biodiversity specialists in the EIA process.

The South African *Draft National Biodiversity Offset Policy*, released in March 2017, clarifies requirements for offsets planning in EIA. While it promotes early consideration of potential offsets for the reasons outlined above, it also emphasises that offsets should only be applied in cases in which residual risks remaining after the full application of the mitigation hierarchy have been confirmed to be acceptable. Whether this goal is achieved in practice will depend to a large extent on the willingness of proponents to comply, the ability of EAPs to find innovative solutions to difficult challenges around planning and implementing offsets, and ultimately the capacity of competent authorities to ensure compliance with the policy. The best practice principles provided a useful framework to structure our evaluation of the policy.

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References

- Apostolopoulou, E., Adams, W.M., 2017. Biodiversity offsetting and conservation: reframing nature to save it. *Oryx* 51, 23-31.
- Aurecon, 2013. Final Environmental Impact Assessment Report: Proposed wind and solar (photovoltaic) energy facilities near Springbok, Northern Cape. Unpublished.
- BBOP, 2009. The relationship between biodiversity offsets and impact assessment: A BBOP resource paper. Business and Biodiversity Offsets Programme, Washington, D.C.
- BBOP, 2012. Biodiversity Offset Design Handbook-Updated. A BBOP Resource Paper. Business and Biodiversity Offsets Programme, Washington DC.
- Bedward, M., Ellis, M.V., Simpson, C.C., 2009. Simple modelling to assess if offsets schemes can prevent biodiversity loss, using examples from Australian woodlands. *Biol. Conserv.* 142, 2732-2742.
- Bigard, C., Pioch, S., Thompson, J.D., 2017. The inclusion of biodiversity in environmental impact assessment: Policy-related progress limited by gaps and semantic confusion. *J. Environ. Manage.* 200, 35-45.
- Botha, M., Desmet, P., Brownlie, S., 2013. Gamsberg Zinc Project: Offset Report. <http://www.erm.com/contentassets/34e202e6c03e4c5f9f0c4338134b71e7/final-esia/annexures/annex-f-biodiversity-offset-report.pdf> Date of access: 7 July 2015.
- Brown, M.A., Clarkson, B.D., Barton, B.J., Joshi, C., 2013. Ecological compensation: an evaluation of regulatory compliance in New Zealand. *Impact Assess. Proj. A.* 31, 34-44.
- Brown, M.A., Clarkson, B.D., Barton, B.J., Joshi, C., 2014. Implementing ecological compensation in New Zealand: stakeholder perspectives and a way forward. *J. Roy. Soc. New Zeal.* 44, 34-47.
- Brownlie, S., King, N., Treweek, J., 2013. Biodiversity tradeoffs and offsets in impact assessment and decision making: can we stop the loss? *Impact Assess. Proj. A.* 31, 24-33.
- Brownlie, S., von Hase, A., Botha, M., Manuel, J., Balmforth, Z., Jenner, N., 2017. Biodiversity offsets in South Africa—challenges and potential solutions. *Impact Assess. Proj. A.*, 35, 248-256.
- Bull, J.W., Suttle, K.B., Gordon, A., Singh, N.J., Milner-Gulland, E., 2013. Biodiversity offsets in theory and practice. *Oryx* 47, 369-380.
- Cadman, M., Petersen, C., Driver, A., Sekhran, N., Maze, K., Munzhedzi, S., 2010. Biodiversity for development: South Africa's landscape approach to conserving biodiversity and promoting ecosystem resilience. South African National Biodiversity Institute, Pretoria.
- CCA Environmental, 2009. Final EIR: Proposed N2 Wild Coast Toll Highway. CCA Environmental Pty Ltd. http://www.nra.co.za/live/content.php?Session_ID=0a258ed74b4d6867d5329b02316a728b&Category_ID=59 Date of access: 15 August 2015.
- CES, 2013. Final environmental impact assessment: Mooi-Mgeni Transfer Scheme – Phase 2, KwaZulu-Natal Province, South Africa. Coastal & Environmental Services., South Africa. http://www.springgrovedam.co.za/docs/FINAL%20EIR%20Mooi-Mgeni%20Transfer%20Scheme%20Phase%202_Part1.pdf Date of access: 15 August 2015.
- Cowell, R., 1997. Stretching the limits: environmental compensation, habitat creation and sustainable development. *T. I Brit. Geogr.* 22, 292-306.
- DEA, 2010. Record of Decision for the proposed N2 Wild Coast toll highway. Republic of South Africa. Department of Environmental Affairs. http://www.nra.co.za/live/content.php?Session_ID=0a258ed74b4d6867d5329b02316a728b&Category_ID=59 Date of access: 4 July 2015.
- DEA, 2014. Environmental Authorisation: Application for environmental authorisation in terms of the National Environmental Management Act, 1998, GN R. 543/544/545/546 for the proposed wind energy facility on Kangnas farm (farm no. 77, portion 3) and Smorgenschaduwe (remainder of farm no. 127), near Springbok, within the Nama-Khoi Local Municipality, Northern Cape. Republic of South Africa. Unpublished.

DEA, 2017. Draft National Biodiversity Offset Policy, in: Department of Environmental Affairs (Ed.). Government Gazette No.40733, Pretoria, pp. 1-34.

DEADP, 2007. Provincial Guideline on Biodiversity Offsets Edition 2. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

DEADP, 2011. IA guideline and information document series: information document on biodiversity offsets. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning.

DEADP, 2015. Environmental authorisation: Application for environmental authorisation in terms of the National Environmental Management Act, 1998 (Act no. 107 of 1998) and the Environmental Impact Assessment Regulations, 2010: The proposed construction of the AfriSam cement plant, limestone and clay quarries and associated infrastructure in Saldanha Bay. Unpublished.

DENC, 2013. The granting of the environmental authorisation for: Gamsberg zinc mine and associated infrastructure, at approximately 15km East of Aggeneys, along the Eastern border of the N14 National road, also the transmission line from the existing Aggeneys sub-station to the Gamsberg mine, Khai-Ma local municipality, Namakwa District Municipality, Northern Cape Province. Province of the Northern Cape, Department of Environment and Nature Conservation., South Africa. <http://www.erm.com/contentassets/34e202e6c03e4c5f9f0c4338134b71e7/environmental-authorisations/gamsberg-environmental-authorisation-from-denc.pdf> Date of access: 15 September 2015.

Eisenhardt, K., 2002. Building theories from case study research, in: Huberman, A., Miles, M. (Eds.), The qualitative researcher's companion. Sage publications, London, pp. 5-36.

EPA, 2006. Environmental offsets position statement no 9. . Environmental Protection Authority of Western Australia, Perth.

EPA, 2007. Guidance for the Assessment of Environmental Factors: Environmental Offsets (Draft). Environmental Protection Authority of Western Australia, Perth.

ERM, 2012. Gamsberg Environmental and Social Impact Assessment Report. Environmental Resources Management. <http://www.erm.com/en/public-information-sites/environmental-and-social-impact-assessment/> Date of access: 15 September 2015.

Ezemvelo KZN Wildlife, 2013. Concise guideline for biodiversity offsets. Provincial Government of Kwa-Zulu Natal, Durban, South Africa.

Gardner, T., von Hase, A., 2012. Key ingredients for biodiversity offsets to achieve no net loss. Wellington, Department of Conservation. http://www.forest-trends.org/documents/files/doc_3211.pdf Date of access: 12 September 2014.

Gibbons, P., Lindenmayer, D.B., 2007. Offsets for land clearing: no net loss or the tail wagging the dog? *Ecol. Manage. Restor.* 8, 26-31.

Gibson, R., 2013. Avoiding sustainability trade-offs in environmental assessment. *Impact Assess. Proj. A.* 31, 2-12.

Government of NSW, 2014. Biodiversity Offsets Policy for Major Projects. Government of New South Wales, Office of Environment and Heritage., Sydney, Australia.

Government of Western Australia, 2014. WA Environmental Offsets Guidelines, Perth, Western Australia.

Hayes, N., Morrison-Saunders, A., 2007. Effectiveness of environmental offsets in environmental impact assessment: practitioner perspectives from Western Australia. *Impact Assess. Proj. A.* 25, 209-218.

IFC, 2012. Guidance Note 6: Biodiversity conservation and sustainable management of living resources. International Finance Corporation: World Bank Group., Washington DC. http://www.ifc.org/wps/wcm/connect/bff0a28049a790d6b835faa8c6a8312a/PS6_English_2012.pdf?MOD=AJPERES Date of access: 10 September 2015.

INR, 2015. Mooi-Mgeni Transfer Scheme – Phase 2: Spring Grove Dam. Preliminary planning of wetland rehabilitation and biodiversity offsets. Institute for Natural Resources (INR), South Africa.

IUCN, 2016. Global policy on biodiversity offsets. The International Union for Conservation of Nature. Available at https://portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2016_RES_059_EN.pdf (Accessed 15 June 2018)

Kidd, M., Retief, F., Alberts, R., 2018. Integrated Environmental Impact Assessment and Management, in: Strydom, H., King, N., Retief, F. (Eds.), *Environmental Management in South Africa*, Juta Publishing, Cape Town, South Africa.

Kiesecker, J.M., Copeland, H., Pocewicz, A., McKenney, B., 2010. Development by design: blending landscape-level planning with the mitigation hierarchy. *Front. Ecol. Environ.* 8, 261-266.

Lukey, P., Cumming, T., Paras, S., Kubiszewski, I., Lloyd, S., 2017. Making biodiversity offsets work in South Africa—A governance perspective. *Ecosyst. Serv.* 27, 281-290.

Macfarlane, D., Holness, S.D., Von Hase, A., Brownlie, S., Dini, J.A. & Kilian, V. 2016. Wetland offsets: A best practice guideline for South Africa. Water Research Commission Report nr TT 660/16.

Madsen, B., Moore Brands, K., Carroll, N., 2010. State of biodiversity markets: offset and compensation programs worldwide, <http://www.ecosystemmarketplace.com/documents/acrobat/sbdmr.pdf>. Date of access: 7 July 2015.

Maron, M., Dunn, P.K., McAlpine, C.A., Apan, A., 2010. Can offsets really compensate for habitat removal? The case of the endangered red-tailed black-cockatoo. *J. Appl. Ecol.* 47, 348-355.

Maron, M., Gordon, A., Mackey, B.G., Possingham, H.P., Watson, J.E., 2016. Interactions between biodiversity offsets and protected area commitments: avoiding perverse outcomes. *Conserv. Lett.* 9, 384-389.

Maron, M., Hobbs, R.J., Moilanen, A., Matthews, J.W., Christie, K., Gardner, T.A., Keith, D.A., Lindenmayer, D.B., McAlpine, C.A., 2012. Faustian bargains? Restoration realities in the context of biodiversity offset policies. *Biol. Conserv.* 155, 141-148.

Maxwell, J., 2002. Understanding the validity in qualitative research, in: Huberman, A., Miles, M. (Eds.), *The qualitative researcher's companion*. Sage Publications, London, pp. 37-64.

May, J., Hobbs, R.J., Valentine, L.E., 2017. Are offsets effective? An evaluation of recent environmental offsets in Western Australia. *Biol. Conserv.* 206, 249-257.

McKenney, B., 2005. Environmental offset policies, principles, and methods: a review of selected legislative frameworks. *Biodiversity Neutral Initiative* 85.

Middle, G., Middle, I., 2010. A review of the use of environmental offset as a policy mechanism in the environmental impact assessment process (EIA) in Western Australia. *Impact Assess. Proj. A.* 28, 313-322.

Morrison-Saunders, A., 2018. *Advanced Introduction to Environmental Impact Assessment*. Cheltenham Edward Elgar.

Norton, D.A., 2009. Biodiversity offsets: two New Zealand case studies and an assessment framework. *Environ. Manage.* 43, 698-706.

Phalan, B., Hayes, G., Brooks, S., Marsh, D., Howard, P., Costelloe, B., Vira, B., Kowalska, A., Whitaker, S., 2017. Avoiding impacts on biodiversity through strengthening the first stage of the mitigation hierarchy. *Oryx*, 1-9.

Pilgrim, J.D., Brownlie, S., Ekstrom, J.M., Gardner, T.A., von Hase, A., Kate, K.t., Savy, C.E., Stephens, R., Temple, H.J., Treweek, J., 2013. A process for assessing the offsetability of biodiversity impacts. *Conserv. Lett.* 6, 376-384.

Quétier, F., Regnery, B., Levrel, H., 2014. No net loss of biodiversity or paper offsets? A critical review of the French no net loss policy. *Environ. Sci. Policy* 38, 120-131.

Quintero, J.D., Mathur, A., 2011. Biodiversity offsets and infrastructure. *Conserv. Biol.* 25, 1121-1123.

Rajvanshi, A., Brownlie, S., Slotweg, R., Arora, R., 2011. Maximizing benefits for biodiversity: The potential of enhancement strategies in impact assessment. *Impact Assess. Proj. A.* 29, 181-193.

- Retief, F., Welman, C.N., Sandham, L., 2011. Performance of environmental impact assessment (EIA) screening in South Africa: a comparative analysis between the 1997 and 2006 EIA regimes. *S. Afr. Geogr. J.* 93, 154-171.
- Rundcrantz, K., Skärbäck, E., 2003. Environmental compensation in planning: a review of five different countries with major emphasis on the German system. *Environ. Policy Gov.* 13, 204-226.
- SANBI, 2012. Draft National Framework for Biodiversity Offsets (Unpublished). South African National Biodiversity Institute.
- SANBI, 2014. Biodiversity mainstreaming toolbox for land-use planning and development - Summarised toolbox for senior managers. . ICLEI – Local Governments for Sustainability and South African National Biodiversity Institute Grasslands Programme, Pretoria, South Africa. http://biodiversityadvisor.sanbi.org/wp-content/uploads/2014/10/Biodiversity-Mainstreaming-Toolbox_for-senior-managers_lores.pdf Date of access: 10 September 2015.
- Sandham, L., Carroll, T., Retief, F., 2010. The contribution of Environmental Impact Assessment (EIA) to decision making for biological pest control in South Africa–The case of *Lantana camara*. *Biol. Control* 55, 141-149.
- Sandham, L.A., Hoffmann, A., Retief, F., 2008a. Reflections on the quality of mining EIA reports in South Africa. *J. S. Afr. I. Min. Metall.* 108, 701-706.
- Sandham, L.A., Moloto, M., Retief, F., 2008b. The quality of environmental impact reports for projects with the potential of affecting wetlands in South Africa. *Water SA* 34, 155-162.
- Scholes, R., Biggs, R., 2005. A biodiversity intactness index. *Nature* 434, 45.
- SEWPaC, 2012. Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy. Government of Australia, Department of Sustainability, Environment, Water, Population and Communities, Canberra, Australia.
- Sowman, M., Fuggle, R., Preston, G., 1995. A review of the evolution of environmental evaluation procedures in South Africa. *Environ. Impact Assess.* 15, 45-67.
- Steffen, W., Richardson, K., Rockström, J., Cornell, S.E., Fetzer, I., Bennett, E.M., Biggs, R., Carpenter, S.R., de Vries, W., de Wit, C.A., 2015. Planetary boundaries: Guiding human development on a changing planet. *Science* 347, 1259855.
- Ten Kate, K., Bishop, J., Bayon, R., 2004. Biodiversity offsets: Views, experience, and the business case. IUCN--The World Conservation Union.
- von Hase, A., Brownlie, S., 2014. AfriSam Saldanha project: summary of biodiversity offset report (unpublished).
- von Hase, A., ten Kate, K., 2016. Correct framing of biodiversity offsets and conservation: a response to Apostolopoulou & Adams. *Oryx* 51, 32-34.
- Yin, R.K., 2003. *Case study research: Design and methods*, 3rd ed. Sage, Thousand Oaks, CA.