Impact Assessment and Project Appraisal, 25(3), September 2007, pages 209–218
DOI: 10.3152/146155107X227126; http://www.ingentaconnect.com/content/beech/iapa

Effectiveness of environmental offsets in environmental impact assessment: practitioner perspectives from Western Australia

Nicole Hayes and Angus Morrison-Saunders

Environmental offsets are positive mitigation measures implemented during environmental impact assessment (EIA) approvals to compensate for unavoidable negative environmental actions. Through interviews with 29 practitioners experienced with offsets, this study investigated the level of support for environmental offsets in Western Australia, implementation of the mitigation sequence and achievement of 'net environmental gain' and 'like for like' in practice. In-principle support for the use of offsets was almost unanimous. However, the practical workability of 'like for like' was questioned along with claims that offsets failed to deliver net benefits. Greater guidance and follow-up will be necessary if practice is to live up to expectation.

Keywords: environmental offsets, environmental impact assessment, Western Australia, environmental compensation

THE WORLD IS FACING unparalleled challenges in conserving its biological wealth and environmental integrity while encouraging sustainable social and economic development (DEC, 2006). Increasing pressures on the environment from development have often resulted in conflicting and competing demands that are not always sustainable (Fish *et al*, 2004). Environmental offsets have been hailed as a mechanism to provide for both development and environmental protection (NSW EPA, 2002; DEC, 2005) and are being increasingly used in environmental impact assessment (EIA) in Western Australia to try to resolve these conflicting needs. Amending slightly the position taken by Rundcrantz and Skärbäck (2003), environmental offsets can be simply defined as actions taken outside of a development site that compensate for the impacts of that development.[1] With respect to the balance of natural capital, the EPA (2006) go one step further than this and define environmental offsets as "environmentally beneficial activities undertaken to counterbalance an adverse environmental impact, aspiring to achieve 'no net environmental loss' or a 'net environmental benefit' outcome". They are a form of mitigation measure often widely referred to as 'compensation' activities in the international literature (Cuperus 2004, ten Kate *et al*, 2004); but in keeping with EIA practice in Australia, the term offsets is used throughout this paper.

The purpose of this paper was to gain an understanding of how the relatively new concept of environmental offsets is working as a tool in EIA as perceived by Western Australian practitioners. While offsets have been incorporated into EIA practice in Western Australia on an *ad hoc* basis for many years as part of the mitigation measures established for some development projects, the formalization of an offsets policy to guide their use is new (EPA 2004; 2005; 2006). Specifically we aimed to determine:

Nicole Hayes is a Graduate Research Assistant and Angus Morrison-Saunders (corresponding author) is Senior Lecturer in Environmental Assessment, School of Environmental Science, Murdoch University, South St, Murdoch WA 6150, Australia; Tel: +618 9360 6125; Fax: +618 9360 6787; Emails: csearal0@yahoo.com; A.Morrison-Saunders@murdoch.edu.au.

The cooperation of the practitioners that participated in this study and the suggestions received from the two anonymous reviewers of the original manuscript for this paper are gratefully acknowledged.

- the degree of support for the use of environmental offsets in EIA;
- the extent to which the more challenging principles, such as using offsets as a last resort mitigation measure and achieving 'net environmental gain', are being achieved in practice;
- the workability and success of the like for like principle; and
- any problems the time dimension poses for the effective use of offsets (that is, time needed to establish functional replacement ecosystems).

Purpose and benefits of environmental offsets

Offsets are intended to ensure that in situations where damage to the environment cannot be avoided or appropriately minimized through other forms of mitigation (that is, there will be a residual impact), a comparable environment can be improved so that a no net loss is achieved. Better still, a 'net environmental gain' may be the aim of offsets, resulting in a positive outcome for the environment (EPA, 2006).

Offsets have been praised as a tool for providing a more flexible and cost effective approach to development whilst achieving greater environmental outcomes (ten Kate *et al*, 2004; DLWC, 2001; NSW EPA, 2002). It has also been suggested that offsets could improve a company's 'social license to operate', increase regulatory goodwill and increase the ability to undertake projects that may have not been possible otherwise (ten Kate *et al*, 2004; ICMM, 2005).

Environmental offsets may be required by legislation or provided on a purely voluntary basis (ten Kate *et al*, 2004; van Merwyk and Daddo, undated). In Western Australia, the Environmental Protection Authority (EPA) has outlined guidelines for the successful use of environmental offsets in EIA practice. Proponents are expected to incorporate offsets into their mitigation commitments, which subsequently become part of the legally binding approval conditions for assessed projects (for a description of the EIA process in Western Australia see Morrison-Saunders and Bailey (2000)).

The EPA first prepared draft guidelines for the use of offsets in 2004 (EPA, 2004). After a public review process, they were amended the following year (EPA, 2005) and finalised in 2006. The current guidelines establish the following principles (EPA, 2006):

- A mitigation hierarchy or sequence should apply such that environmental offsets are only considered after all other reasonable attempts have been exhausted;
- Using a combination of 'direct' and 'contributing' offsets, there should be an aspirational aim of achieving a net environmental benefit; and
- Environmental offsets should ideally be like for like or better.

These three concepts are explored in turn.

Mitigation sequence

When considering a project for environmental approval, many EIA regulators internationally require the proponent to demonstrate adherence to the mitigation sequence of avoid, minimize, rectify, reduce and then utilize offsets as a last resort (Canter and Weems, 1995; Brown and Lant, 1999; Shabman and Scodari, 2005; GAO, 2005; Cuperus *et al*, 2001; Rundcrantz and Skärbäck, 2003; Cuperus, 2004; Slootweg *et al*, 2006), as is the case in Western Australia (EPA, 2006). It is generally held important that this sequence is followed and that the acceptability and manageability of impacts are considered before offsets are brought into the equation. Within the concept of compensation itself, a hierarchy of approaches can be identified where the preferred order of methods is restoration, creation, enhancement and preservation, where the last two refer to existing habitat under threat of conversion (Brown and Lant, 1999; Rundcrantz and Skärbäck, 2003).

The EPA (2006) suggests that, if a project is not acceptable without offsets, then it is not acceptable with offsets (that is, offsets or compensation measures cannot render an otherwise unacceptable proposal into one that is environmentally acceptable, meaning that offsets should not be used to enable environmental trade-offs). Similarly Rundcrantz and Skärbäck (2003) highlight the "risk of unnecessary disturbance", cautioning that offsets should not be used by developers to permit unnecessary impacts, that is, ones that could be avoided.

Net environmental gain

In Western Australia, it is the EPA's opinion that environmental offsets should have the aspirational goal of achieving a net environmental benefit or net environmental gain through the use of direct and contributing offsets.[2] A direct offset counterbalances an impact directly (EPA, 2006); for pollution emissions this would entail sequestration actions to remove an equivalent amount of that particular substance, while for ecosystems this might entail rehabilitation of existing degraded areas, the re-establishment of ecosystems where they have been removed in the past or even translocation of species from the impact area to a rehabilitation area. A contributing offset complements direct offsets and may include:

- conservation activities (for instance, land acquisition and covenanting or transfer into the conservation estate);
- protection (for instance, fencing, buffering, bunding[3]);
- new research;
- removal of threats;
- ongoing management activities (for instance,

monitoring, maintenance, preparation and implementation of management plans);
- use of 'banking' or 'credit-trading' schemes to purchase equivalent environmental credits elsewhere; and
- going beyond best practicable measures for pollution control (for instance, beyond compliance and/or continuous improvement).

The rationale for seeking a net environmental benefit or at the very least no net loss is obvious; without it the cumulative impact of development would gradually destroy environmental assets. Although this goal is sound in principle, it is timely and important to determine if it is actually achievable and occurring in practice.

Concept of 'like for like'

The concept of like for like (Cuperus, 2004; EPA, 2006) aims to ensure that the offset activity counterbalances the same type of impacted emission or ecosystem. Ecosystems should be alike with respect to environmental values, vegetation, habitat, species, ecosystems, landscape, hydrology and physical area. In short, they should serve the same ecological functions (Society of Wetland Scientists, undated) and should also be within the same bio-area and preferably locality (Rundcrantz and Skärbäck, 2003). This is to ensure that comparable areas/ecosystems are not systematically degraded and offsets are not diluted or concentrated within a certain geographical area or bioregion (EPA, 2006).

The Society of Wetland Scientists (undated) notes that newly created habitat (in its case wetlands) is less desirable as an offset than restored habitat, because of the greater chance of the latter meeting like for like and ecological function expectations. With respect to emissions, like for like refers to the chemical nature and quantity of the emissions. 'Like for like or better' refers to the same principles as like for like but aims to improve on what is required for like for like by increasing the quality or quantity of the offset activity (EPA, 2006).

Without the rationale for seeking a net environmental benefit or at least no net loss, the cumulative impact of development would gradually destroy environmental assets: although this goal is sound in principle, it is important to determine if it is actually achievable and occurring in practice

Criticisms of environmental offsets

Although offsets sound appealing in principle, a number of concerns about practice have been raised. One difficulty arises from the lack of accurate and sufficient data combined with difficulties in the valuation of biodiversity needed to determine both what type of offset is required and how comparable and effective the selected offset actually is (Cuperus, 2004), particularly in regard to ecological functioning (Society of Wetland Scientists, undated; Rundcrantz and Skärbäck, 2003). Other problems include time lags between project impact and offset deliverance and missing steps in the mitigation sequence (Cuperus, 2004).

The definition of 'net benefit' or 'no net loss' (subject to the regulations in a particular jurisdiction) has caused some controversy in wetland mitigation (NSW SWAC, 2002). It has been suggested that in some cases the definition applies to the area alone, meaning that values, functions and services provided by wetlands are not necessarily compensated for, allowing highly functional natural wetlands to be replaced by low function compensatory wetlands (NSW SWAC, 2002). A similar concern for the ecological values of forest areas in the Netherlands was raised by Cuperus (2004).

A review by the US National Academy of Science and the General Accounting Office of mitigation banking in 2001 (cited in DEC, 2006) identified that the goal of no net loss was not being achieved because of: a lack of oversight and enforcement; problems with record keeping; impacts not being fully compensated for; and wetlands being created in areas that were not naturally wetland areas. In contrast, the SO_2 allowance trading program in the USA has been considered successful in reducing emissions at a cost significantly less than in the absence of trading programs, supporting the case for the use of market-based instruments in environmental management (Stavins, 2005).

A final concern relates to the time dimension. An offset agreement should not lead to permanent environmental costs because of the delay before offsets yield the environmental benefits intended (DLWC, 2001). Clearing has an immediate impact whereas recreating a natural system can take long periods of time and the outcomes are uncertain.

For example, the destruction of a wetland and creation of a new development is almost instantaneous. In contrast, the creation of a new wetland or the rehabilitation of a degraded one may take at least a decade before the system is fully functional and stable (NSW SWAC, 2002). Apart from the ecological imbalance this poses, the time issue also poses a challenge for traditional EIA with respect to maintenance and enforcement of approval conditions, especially if a proponent is expected to manage an offset site long after the project activity for which the offset was required has ended (for instance, clearing land to build houses).

Methodology

Interviews were conducted with 29 Western Australian EIA practitioners representing Government agencies (6), EIA regulators (6), consultants (9) and industry proponents (8). These practitioners were chosen opportunistically on the basis that they had some experience with offsets policy-making and/or implementation in practice. A structured questionnaire (Table 1) based around a seven-point Likert scale was used to gauge the extent to which individuals agreed or disagreed with statements about the use of offsets (where 1 represented 'to no extent' and 7 'to a large extent').

The questions were based around the EPA's (2006) position statement on offsets (the principles of which were originally articulated in EPA (2004) so had been a part of EIA practice for several years at the commencement of the research). Each survey question was accompanied by an open-ended justification or 'please explain' section to enable participants to express any concerns, criticisms or comments regarding the subject matter. No response was recorded for questions where practitioners lacked expertise in those particular areas (hence sometimes $n<29$).

Results

We present the responses to our survey questions in turn along with relevant comments from the international literature.

Support for the use of environmental offsets

There was very strong support in principle for the use of offsets in EIA (Figure 1) by the participants in this study. Offsets were acknowledged as a critical tool for achieving sustainability and are identified as playing an important role in cases where developments of state significance coincide with sensitive environments. Although not without their criticisms, based on this high level of general support for the concept, it appears that offsets will be an important and useful tool to address environmental issues in future EIA practice in Western Australia.

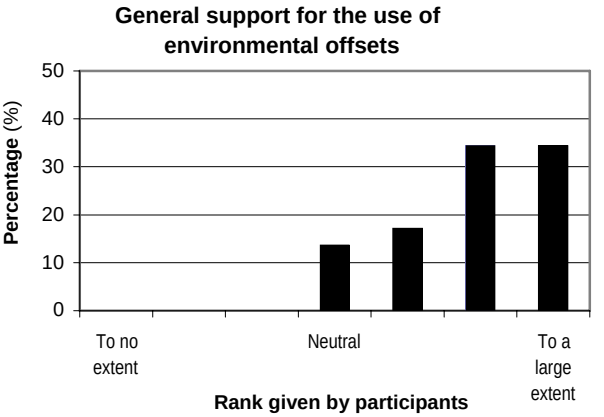

Figure 1. Level of in-principle support for the use of offsets (*n*=29)

Adherence to the mitigation sequence

There was a clear split between practitioners who believe the mitigation sequence is being implemented and those who do not, with the middle (that is, neutral) position being the most common ranking (Figure 2). With respect to practitioner comments, ten respondents believed that the mitigation sequence was not being followed and that little effort is being made to avoid impacts, while the same number thought it was being implemented well (Table 2). Similarly, while a number of people suggested that the EPA reprimands proponents that do not follow the mitigation sequence, others suggested that the EPA itself was asking proponents to commit to offsets upfront (that is, before a complete assessment of the likely residual impact had taken place).

Given the uncertainty surrounding this issue, it seems fair to conclude that the mitigation sequence is not always being applied to its full extent in Western Australia, a trend that has been noticed by other

Table 1. Survey questions

1	To what extent do you support the use of environmental offsets in environmental management?
2	To what extent do you believe that the EPA's mitigation sequence: avoidance, minimize, rectify, reduce then offset as a last resort is being followed in practice?
3	To what extent do you believe a net environmental gain is being achieved through the use of environmental offsets for: a) Ecosystems b) Emissions
4	To what extent is the EPA's concept of like for like workable in practice?
5	To what extent does the like for like principle provide the best environmental outcome?
6	How important is the time dimension when applying environmental offsets?

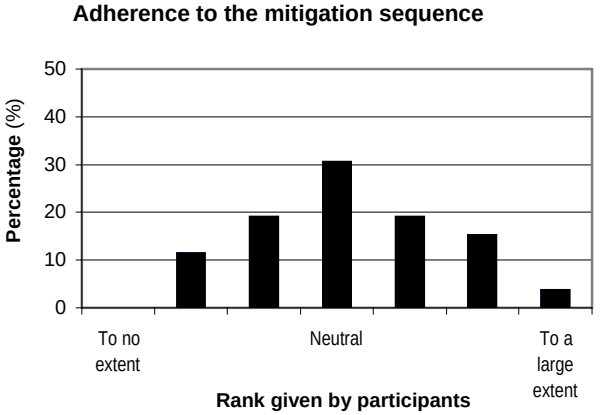

Figure 2. Practitioner's perspective on the extent to which the mitigation sequence is being adhered to in practice (*n*=23)

Table 2. Practitioner comments concerning the mitigation sequence

Comments	Number of responses
Mitigation sequence not being followed in general, little effort is being made to avoid impacts	10 (38.4%)
Mitigation sequence is being implemented well	10 (38.4%)
The EPA do not follow the mitigation sequence as they ask for offsets up front, before determining if a significant residual impact is likely to occur	5 (19.2%)
Mitigation sequence is not being followed by proponents, however in most cases they are reprimanded by the EPA	3 (11.5%)

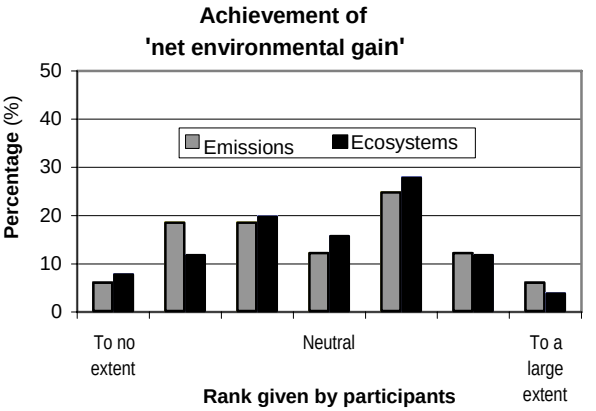

Figure 3. Extent to which practitioners believe a 'net environmental gain' is being achieved for emissions (n=16) and ecosystems (*n*=25)

commentators. The main concern appears to be that offsets somehow legitimate activities that might otherwise not be approved. Baird (2003) concluded that offsets provide an increased flexibility for land clearing, rather than promoting avoidance. He noted that some offset practices appear to be considered at the beginning of, and throughout, the assessment process; a trend that was identified in this study, with some practitioners claiming that the EPA is guilty of violating the mitigation sequence by asking for offsets in the referral stage before it is determined whether a significant residual impact would remain.

Similar views that authorities are not putting enough emphasis on the earlier mitigation stages, such as avoidance, were highlighted by ten Kate *et al* (2004) through an interview with Julie Sibbing from the National Wildlife Federation (NWF), who was quoted as saying that many regulators in the USA will "readily admit that they allow wetlands to be destroyed that could be avoided because they feel it is just easier to require mitigation than to say 'no'". From a sustainability point of view, it is important that the acceptance of offsets as a legitimate form of mitigation does not open the doors to environmental trade-offs; the mitigation sequence is important and must somehow be upheld during EIA practice.

Achievement of net environmental gain

Opinions were fairly divided with respect to whether there has been an achievement of a net environmental gain with an approximately even split of those who thought this was or was not being achieved for ecosystems and emissions alike (Figure 3).

Uncertainty surrounding how to measure and compare environmental values, and the lack of monitoring were commonly referred to as reasons why a net environmental gain was not being achieved or why practitioners could not determine if it is being achieved in practice. Two participants were also of the belief that it should not be incumbent on industry to provide a net environmental gain, arguing that industry has simply become a 'cash cow' to pay for past bad political decisions.

One of the biggest drawcards advocating the use of offsets is that it creates a positive for the environment and works towards sustainability. However, only 28% of participants suggested that a net environmental gain was being achieved. It is inappropriate to sell a project based on its positives for the environment but not do enough to ensure that a net environmental gain is attained once the approval has gone through. Other studies have also shown failure to achieve a net environmental gain or no net loss (Shabman and Scodari, 2005; Ambrose, 2000, Quigley and Harper, 2006; Brown and Lant, 1999; van Merwyk and Daddo, undated; Harper and Quigley, 2005).

Turner *et al* (2001, cited in ten Kate *et al* (2004)) said that "America's top restoration scientists believe that about 80% wetlands built for mitigation in [the USA] do not succeed in becoming fully functional". The NSW State Wetland Advisory Committee (NSW SWAC, 2002: 13) also acknowledge that "compensatory actions such as constructed wetlands have not always successfully replaced what has been destroyed".

Baird (2003) argues that offsets that involve transferring privately owned land into the conservation estate will lead to a net loss in vegetation. He concluded that a net gain in vegetation quantity can only be achieved if the offset is highly likely to be cleared if not added to the conservation estate, and that an increase of vegetation quality would only be seen if the future management is better than the previous management practices (Baird, 2003). One of the participants in this study made a similar comment, suggesting that land is already protected from clearing via existing legislation, hence transferring it into the conservation estate does little to improve the net environmental state of the environment.

Offsets were seen by some practitioners interviewed as an easier alternative than adherence to the earlier mitigation sequence steps, especially that of avoidance. This study has highlighted the need for greater focus on the avoidance of impacts. This could become more favourable if the rigorous

This study has highlighted the need for greater focus on the avoidance of impacts: this could become more favourable if the rigorous implementation of offsets was required, ensuring that a net environmental gain could demonstrably be achieved

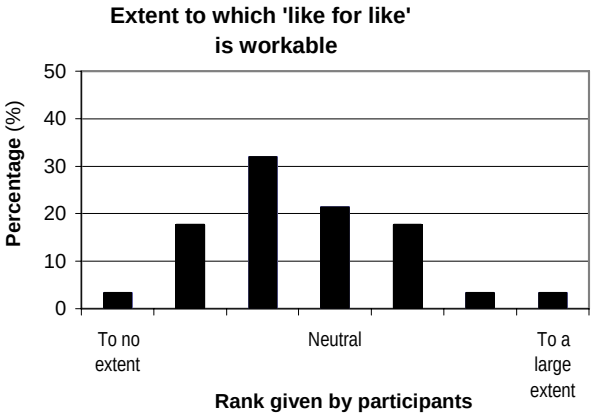

Figure 4. Extent to which practitioners believe the 'like for like' principle is workable in practice (*n*=28)

implementation of offsets was required, ensuring that a net environmental gain could demonstrably be achieved. If offsets were to be implemented properly, with the strict requirement of a net environmental gain, measures in place to address the risk of failure and if proponents are held more accountable in the public eye through a monitoring and reporting system, we may find the use of avoidance increase as it would be seen as an easier and cheaper approach to managing environmental impacts.

Some ways forward for better attainment of a net environmental gain include:

- More emphasis on requiring the offset to be delivered.
- Positive offset ratio implemented where a risk of failure exists (Ambrose, 2000; EPA, 2006) and emphasis on large offset sites to avoid ecological fragmentation associated with small areas of habitat (Cuperus, 2004).
- A bond type system should also be considered instead of, or in addition to, the offset ratio, ensuring that funds are available to make corrections where an offset fails (Canter and Weems, 1995) or where the developer goes bankrupt or for some other reason is unable to fulfil environmental offset obligations (Rundcrantz and Skärbäck, 2003). Liability for the failure of the offset should also be clearly stated in all offset agreements.
- Some scope to adjust the offset required to address the impact that actually occurs, not what is predicted.
- Better valuation of ecosystem components, functions and services to aid compatibility of offset values to impact (Cuperus, 2004).
- Comprehensive monitoring and enforceability (Ambrose, 2000; Society of Wetland Scientists, undated; Canter and Weems, 1995; Rundcrantz and Skärbäck, 2003; Harper and Quigley, 2005).
- Progress of all offsets recorded on a database to make the process of offsets transparent and for others to see and easily compare what offsets have already been implemented and how well they are achieving their targets.
- Reconsider the contributions to the conservation estate as a direct offset because of the inability to meet the additional criteria (Baird, 2003)
- Use of the precautionary principle when lacking accurate and sufficient data on the impacted environment and lack of experience in its restoration (Cuperus, 2004; Bohlen and King, 1995).
- Clear definition of values to be compared to determine the net environmental gain, for instance, area, habitat, ecosystem functions (chemical, physical and biological processes), productivity, habitat fragmentation/connectivity (Canter and Weems, 1995; Ambrose, 2000; Cuperus, 2004).
- Clear and enforceable consequences of failure to deliver an offset.

Rundcrantz and Skärbäck (2003) further highlight the need for long-term regional planning so that the provision of offsets occurs in a strategic context rather than at the individual project-based reactive level. A strategic approach will be essential if the aspiration of net environmental gain is to be achieved in practice.

Practicality of the like for like concept

A slight majority of practitioners interviewed did not believe that like for like is workable in practice (Figure 4). Practitioners who believed that the principle is unworkable suggested that this was because of the difficulties in defining like for like and comparing ecological values (six practitioners, 21.4%). Others (four, 14.2%) stated the difficulty in finding and acquiring comparable land, especially in constrained areas, as a major problem hindering the workability of like for like. Two practitioners acknowledged that the process may be difficult for individuals and small and under-resourced companies to find appropriate offsets (Table 3). It was suggested that the support of a database identifying potential offsets could help to remove this difficulty.

Practitioners supporting the requirement of like for like argue that it is not a valid offset if it is not like for like. This principle ensures that the ecological

Table 3. Practitioner comments concerning the like for like concept

Practitioner comments	Number of responses
Like for like is difficult to implement	17 (60.7%)
Like for like is workable in practice	6 (21.4%)
Difficult to define like for like and compare values	5 (17.8%)
Difficult due to lack of comparable land, especially in highly constrained areas	4 (14.2%)

community at risk is being compensated with the same ecosystem preventing a loss in representation (Cuperus, 2004). However, others interviewed argued that like for like may not provide the best outcome and a more flexible approach needs to be adopted. It has been suggested that a strategic or prioritized set of natural assets should be identified to determine where offsets can provide the best outcome and that, perhaps, the needs of the environment should be considered at a regional level. Environmental assets are prioritized to some extent as critical assets, however, they are viewed by some as too widely drawn and others as too narrowly drawn (van Merwyk and Daddo, undated).

In Germany, a concept of compensation pools (well mapped out collection and concentration of useable sites and measures for compensation) is used to consolidate offsets into strategic and long-lasting locations. A pool must provide permanent protection of the compensation measures against other land-use projects and permanent maintenance measures (Wende *et al*, 2005). This is a variation on the mitigation banking concept discussed previously.

It is fairly evident from this study that the practitioners interviewed are finding it hard to make the like for like principle workable in practice (Figure 4). Given the overwhelming in-principle support for the use of offsets (Figure 1), this implies that the lack of workability is not from a lack of trying or willingness on behalf of those interviewed.

Issues hindering the workability of offsets identified by practitioners include:

- Uncertainty surrounding how 'like' the offset has to be to the impact.
- That biodiversity values are hard to measure, causing difficulties in comparing impact and offset.
- Lack of accurate and sufficient data to enable humans to replace complex systems.
- Difficulties in finding and acquiring comparable land.
- The requirements for offsets are not standardized among the various Government agencies involved in environmental management and protection in Western Australia.

Suggestions from participants for improving the workability of the like for like principle included:

- More resources to be put into research into the complexity and functionality of biodiversity and ecosystems (perhaps in the form of a contributing offset). Cuperus (2004) also noted the need for further ecological research concerning offsets.
- Clearer definition of like for like and how 'like' the offset has to be to the impact site.
- Access to a database in which Government agencies and other stakeholders can, if they wish, nominate potential offset sites or projects.
- Standardization and consensus on environmental priorities among the various Government agencies responsible for land-use planning and environmental management.
- Making use of covenants on land titles more standardized (or conventional) to secure an offset site without the need to obtain ownership of the land.

As mentioned before, follow-up studies will be necessary to gauge the success of environmental offsets in terms of delivering ecosystem function and like for like equivalence (Society of Wetland Scientists, undated; Rundcrantz and Skärbäck, 2003) following implementation.

Environmental outcomes and like for like principle

Pursuing the utility of the like for like concept further, practitioners were asked to reflect on the extent to which this principle produces the best environmental outcome for an EIA proposal. The results show that it is fairly evenly split between those who believe a like for like provides the best environmental outcome (nine respondents, 34.6%) and those who do not (11 respondents, 42.3%), with nobody taking the extreme position in either side (Figure 5; Table 4).

When we looked at the type of practitioners and how they responded, it emerged that industry and consultants held a stronger belief that like for like did not provide the best environmental outcome than Government or regulators, none of whom thought that like for like did not provide the best environmental outcome (sample size did not permit statistical

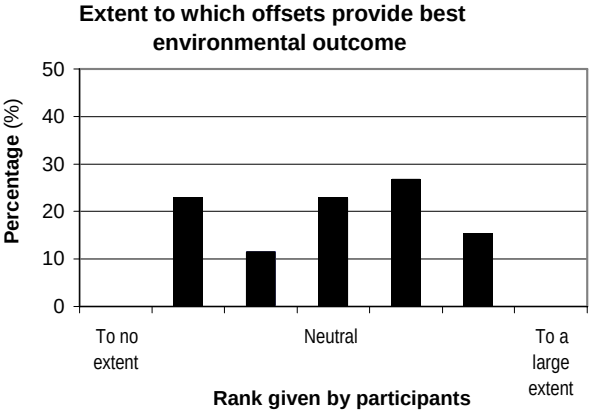

Figure 5. Extent to which practitioners believe the 'like for like' principle provides the best environmental outcome (*n*=26)

Table 4. Practitioner comments concerning like for like contribution to environmental outcomes

Practitioner comments	Number of responses
May not provide the best environmental outcome, need for more flexibility	7 (26.9%)
Like for like principle is important as it identifies where else the threatened ecological community exists. It is not an offset if it is not like for like	6 (23.1%)
A strategic or prioritized set of natural assets needed to identify where offsets can provide the best outcome	5 (19.2%)
How is the 'best environmental outcome' judged?	3 (11.5%)
Like for like principle does not provide the best environmental outcome	3 (11.5%)

verification of this split). It may be that industry and consultants are on the ground working closely with the offset, which makes them believe that like for like is not providing the best environmental outcome. Practitioners from Government and the EPA are more removed from the situation on the ground and appear to focus more on the principles than what occurs in practice.

The main reason provided by practitioners as to why like for like does not provide the best environmental outcome was that, where a particular habitat to be impacted is already well represented in the conservation estate (and for which land suitable for offsets is not readily available), it could be more advantageous overall to allow the proponent to provide protection of a more rare or threatened ecosystem instead. Ten Kate *et al* (2004) interviewed Geoff Burton of Environment Australia who commented that it is "often better to aim for conservation of complex systems [rather than] direct equivalence". He adds, however, that direct equivalence may be appropriate where unique habitats or endangered species are concerned.

Ten Kate *et al* (2004) argue that there should be some geographic flexibility to enable conservation effort to be focused on areas where long-term conservation is more likely. This highlights the need for consensus between environmental agencies and planning departments to ensure that offsets are being put in places designated for conservation and will not cause conflict with development in the future, hence avoiding further offsetting.

Practitioners interviewed also highlighted the difficulties with judging whether like for like provides the best outcome. With so much difficulty surrounding the valuation of biodiversity, determining what the best environmental outcome is can be problematic and highly subjective.

Importance of time dimension when applying offsets

There was overwhelming recognition from the interviewees that the time dimension is an important consideration with the implementation of offsets in EIA (Figure 6). The two main issues identified were time lag and implementation timeline for offsets (Table 5).

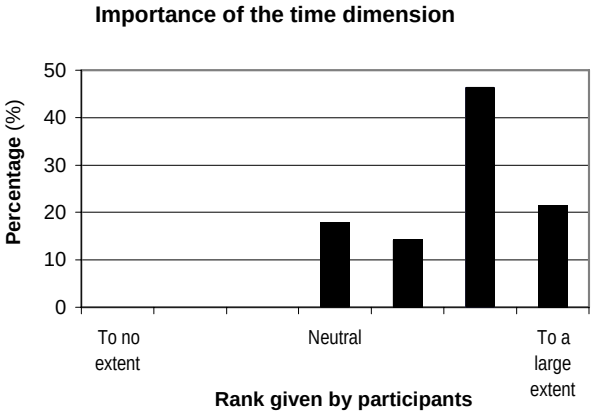

Figure 6. Perceived importance of the time dimension for environmental offsets (*n*=28)

Time lag with respect to offsets is the time between when an impact occurs and when the offset is fully functional to compensate for the impact; this was identified by a majority of participants (21 respondents, 75%). It was noted that a negative net benefit exists until the time that the offset is fully implemented to the standard predicted to compensate for the impact and produce a no net loss. The problem with time lag is perhaps most significant where biodiversity issues are concerned.

The DLWC (2001) notes that where clearing has an immediate impact, recreating natural ecosystems can take long periods and the outcomes are uncertain. For example, tree hollows can take 100 years to develop, allowing regional extinctions to occur whilst new hollows are developing (DLWC, 2001); Cuperus (2004) made similar observations about forest ecosystems. Some practitioners have suggested that a project should be required to offer an offset up front or at least as fast as the impact is occurring (five practitioners, 17.8%). Similarly, the DLWC (2001) suggested that clearing should only proceed when the offset site is making acceptable progress towards the predicted ecological state and management arrangements are legally secure.

Table 5. Practitioner comments concerning timing issues

Practitioner comments	Number of response
The time lag between when the impact occurs and the offset begins compensating for the impact is an important consideration	21 (75%)
The timeline for the implementation of offsets must be clear and within realistic boundaries, considering the companies ability to create income and the clearly defining when liability ends	7 (25%)
Offsets should be put in at the same rate at which the impact occurs or ideally be provided up front	5 (17.8%)

Banking and trading systems can allow for up-front offsets to reduce or eliminate the issues of time lag as well as uncertainty surrounding the products of the offset (NSW SWAC, 2002; Shabman and Scodari, 2005; Canter and Weems, 1995). The DLWC (2001) suggests that where time lag is relatively short and risk is manageable it may be possible to compensate by increasing the number of offset credits required.

The offset implementation time line is another issue that concerned a number of practitioners interviewed (seven practitioners, 25%). Many wished to have some clarity and flexibility with respect to when the offset was to be implemented and how long the proponent was liable concerning the success of the offset. For example, if unforeseeable actions occur (such as drought, fire or inability to rehabilitate successfully as a result of a lack of knowledge or techniques) that hinder the progress of the offset towards attaining a net environmental gain, is the proponent responsible if it followed all the actions in its offset management procedure? Or should the Government be responsible for not seeing the potential risk and downfalls of the offset and granting approvals anyway?

At present it is apparent that EIA approval conditions in Western Australia require the proponent to conduct activities (offsets) that are *predicted* to provide a net environmental gain; they do not, however, require the proponent to *deliver* a net environmental gain: that is, adaptive management is not required where a monitoring program identifies that the predicted net environmental gain has not been achieved. Ambrose (2000) also found that successful achievement of the permit conditions does not necessarily mean that mitigation goals have been achieved, as permit conditions may be inadequate.

Conclusions

Our objective in undertaking this study was to gain a better understanding of how the relatively new concept of environmental offsets is working in practice in Western Australia. We deliberately sought to determine whether some of the more controversial or idealistic principles were working or being applied in practice.

It is apparent that the EIA practitioners surveyed gave a strong in-principle endorsement of the use of environmental offsets, but subsequently expressed considerable concerns about practice, indicating that implementation does not live up to the theoretical expectations. In particular, the mitigation sequence has not always been followed and a net environmental gain is not always achieved. The workability of like for like is also challenging and the extent to which it produces the best environmental outcome has been questioned.

Our goal was to test the potentially 'ideal' position represented by EPA (2006); it must be remembered that attempting to establish offsets, even if they do not live up to the idea of no net loss must be more desirable environmentally than development in the absence of any attempt at compensation. Dealing with time lag and the timeline of implementation were considered to be of high importance amongst practitioners.

It is important to ensure that implementation of offsets is executed to the highest standard obtaining the largest certainty of outcome possible, otherwise offsets will merely be a tool to allow the flexibility for more projects to be approved without delivering the positives to the environment that this technique has promised. Some guidance and capacity building may need to be made available to proponents to help them implement offsets to a higher standard and deliver on intended outcomes.

Additionally, rigorous follow-up studies will be necessary to ensure that offset measures are put in place in the first instance and to study and learn about which approaches are most effective once implemented. If used correctly, offsets should provide an effective tool to address the problem of residual environmental impacts in EIA and thereby help reverse environmental degradation trends.

Notes

1. This is the definition used internally by the federal Department of the Environment and Water Resources, Australia.
2. Rundcrantz and Skärbäck (2003) observe that terminology concerning environmental offsets (or compensation in their usage) varies greatly across international practice; rather than duplicate their review of similarities and differences here, we restrict ourselves to the EPA's terminology in Western Australia familiar to the practitioners interviewed in this study.
3. A 'bund' is a protective dyke.

References

Ambrose, R F 2000. Wetland mitigation in the United States: assessing the success of mitigation policies. *Wetlands*, **19,** 1–27.

Baird, T 2003. How can a native vegetation offset policy contribute to a 'no net loss' of native vegetation quality and quantity? Thesis submitted for Master of Science In Environmental Science, Murdoch University, Western Australia.

Bohlen, C and D King 1995. Location and wetland values: some pitfalls of offsite wetland mitigation in the Chesapeake watershed. In *Proceedings of a Conference. Towards a Sustainable Coastal Watershed: The Chesapeake Experiment. June 1–3, Norfolk, VA*, eds. Paula Hill and Steve Nelson, pp. 268–279. Edgewater MD: Chesapeake Research Consortium.

Brown, P and C Lant 1999. The effect of wetland mitigation banking in the achievement of no-net-loss. *Environmental Management*, **23**(3), 333–345.

Canter, L and W Weems 1995. Planning and operational guidelines for mitigation banking for wetland impacts. *Environment Impact Assessment Review*, **15**(3), 197–218.

Cuperus, R 2004. *Ecological Compensation of the Highway Impacts: Negotiated Trade-off or No-net-loss?* Delft, The Netherlands: Strapatz.

Cuperus, R, M Bakermans, H Udo De Haes and K Canters 2001. Ecological compensation in Dutch highway planning. *Environmental Management*, **27**(1), 75–89.

DEC, Department of Environment and Conservation 2005. *BioBanking — a Biodiversity Offsets and Banking Scheme*. Sydney: Department of Environment and Conservation.

DEC, Department of Environment and Conservation 2006. Biobanking — an investigation of market based instruments to secure long term biodiversity objectives. Background paper, Department of Environment and Conservation, Sydney.

DLWC, Department of Land and Water Conservation New South Wales 2001. *Offsets, Salinity and Native Vegetation*. Sydney: DLWC.

EPA, Environmental Protection Authority 2004. Environmental offsets preliminary position statement no 9. Perth: Environmental Protection Authority.

EPA, Environmental Protection Authority 2005. Environmental offsets preliminary version 2 position statement no 9. Perth: Environmental Protection Authority.

EPA, Environmental Protection Authority 2006. Environmental offsets position statement no 9. Perth: Environmental Protection Authority.

Fish, S, D Snashall and J Streater 2004. Offsetting environmental impacts to facilitate mining. Available at <http://www.forest-trends.org/biodiversityoffsetprogram/BBop%20library%202/Australia/Not%20Printed/Offsetting%20to%20Facilitate%20Mining.pdf>, last accessed 8 May 2006.

GAO, Government Accountability Office of United States 2005. *Wetlands Protection — Corps of Engineers does not have an Effective Oversight Approach to Ensure that Compensatory Mitigation is Occurring*. Washington DC: GAO.

Harper, D and J Quigley 2005. No net loss of fish habitat: a review and analysis of habitat compensation in Canada. *Environmental Management*, **16**(3), 343–355.

ICMM, International Council on Mining and Metals 2005. Biodiversity offsets: a proposition paper. London: ICMM.

Morrison-Saunders, A and J Bailey 2000. Transparency in EIA decision-making: recent developments in Western Australia. *Impact Assessment and Project Appraisal*, **18**(4), December, 260–270.

NSW EPA, New South Wales Environmental Protection Authority 2002. Green offsets for sustainable development — concept paper, April 2002. Sydney: DEC.

NSW SWAC, New South Wales State Wetland Advisory Committee 2002. Compensatory wetlands — a discussion paper under the NSW Wetlands Management Policy. Sydney: DLWC.

Quigley, J and D Harper 2006. Compliance with Canada's *Fisheries Act*. A field audit of habitat compensation projects. *Environmental Management*, **37**(3), 336–350.

Rundcrantz, K and E Skärbäck 2003. Environmental compensation in planning: a review of five different countries with major emphasis on the German system. *European Environment*, **13**(4), 204–226.

Shabman, L and P Scodari 2005. The future of wetlands mitigation banking. *Choices*, **20**(1), 69–70. Milwaukee WI: American Agricultural Economics Association.

Slootweg, R, A Kolhoff, R Verheem and R Hoft 2006. Biodiversity in EIA and SEA — background document to CBD decision VIII/28: voluntary guidelines on biodiversity-inclusive impact assessment. The Netherlands: Commission for Environmental Assessment.

Society of Wetland Scientists undated. Wetland mitigation banking position statement. Available at <http://www.sws.org/wetland_concerns/banking.mgi>, last accessed 24 May 2007.

Stavins, R 2005. Lessons learned from SO_2 allowance trading. *Choices*, **20**(1), 53–58. Milwaukee WI: American Agricultural Economics Association.

ten Kate, K, J Bishop and R Bayon eds. 2004. *Biodiversity Offsets: Views, Experience and the Business Case*. Gland Switzerland and Cambridge, UK: IUCN; and London: Insight Investment.

Turner, R, A Redmond and J Zelder 2001. Count it by acre or function — mitigation adds up to net loss of wetlands. In *Biodiversity Offsets: Views, Experience and the Business Case*, eds. K ten Kate, J Bishop and R Bayon. Gland Switzerland and Cambridge, UK: IUCN; and London: Insight Investment.

van Merwyk, T and S Daddo undated. *Structuring Environmental Offsets for a Sustainable Advantage,* Available at <http://www.forest-trends.org/biodiversityoffsetprogram/BBop%20library%202/Australia/Already%20Printed/Structuring%20Environmental%20Offsets.pdf#search=%22Structuring%20Environmental%20Offsets%20for%20a%20Sustainable%20Advantage%20%22>, last accessed 12 March 2006.

Wende, W, A Herberg and A Herzberg 2005. Mitigation banking and compensation pools: improving the effectiveness of impact mitigation regulation in project planning procedures. *Impact Assessment and Project Appraisal*, **23**(2), 101–111.