How Can A Native Vegetation Offset Policy Contribute To A 'No Net Loss' Of Native Vegetation Quality And Quantity?

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Declaration

I declare that this thesis is my own account of my research and contains as its main content work that has not been previously submitted for a degree at any tertiary educational institution

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Abstract

Native vegetation offsets for vegetation loss is a relatively new policy area, although wider environmental offsets, including wetland banking, greenhouse gas and others have been used for the last thirty to forty years. This study sought to investigate how native vegetation offsets can contribute to the goal of 'no net loss' of native vegetation quality and quantity in Western Australia.

To determine whether native vegetation offsets can achieve this goal, this study reviewed literature on native vegetation offsets, wider environmental offsets, restoration ecology and the environmental impact assessment (EIA) process in Western Australia. Interviews were conducted with key policy people in government agencies and environmental conservation organizations to gain a deeper understanding of offset issues. A sample of recent offsets was also analyzed to determine current practice in Western Australia.

It was established through the literature review, interviews and recent examples of offsets that offsets in general had under-performed in relation to achieving their individual goals and objectives. Areas of under-performance include the inability of most offsets to replace the function and form of the impacted area, lack of auditing and compliance and inappropriate application of offsets.

However, this study demonstrates that native vegetation offsets can contribute to a no net loss of native vegetation quality and quantity through adherence to criteria and principles

that facilitate no net loss of native vegetation quality and quantity. This can be better achieved now in WA because of proposed clearing regulations and penalties that will assist in reducing legal and illegal clearing.

Finally, this study has established that native vegetation offsets can contribute to no net loss of native vegetation quality and quantity mainly through restoration of native vegetation and by contributing to biodiversity protection and enhancement projects (BPEP's).

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Chapter One: Introduction

1.0 Introduction

This introductory chapter describes the context of the research project, the research question, and outlines the organization of this thesis.

1.1 Context

The Western Australian (WA) Government has agreed to a number of national agreements and targets that incorporate various approaches to native vegetation management ranging from minimizing loss, to no net loss and net gain policies. However, unlike NSW and Victoria, who have both released policies in 2001 and 2002 respectively, WA has not developed a explicit policy framework for native vegetation management that is consistent with the national agreements and state government policy.

The collective effect of current state government policy and programs pertaining to native vegetation protection and management, and, specifically the introduction on June 26th 2002 of the Environmental Protection Act Amendment Bill (2002), highlight the lack of an overarching framework that addresses and responds to the ongoing loss of native vegetation and what can be done across government to address this loss. Without a strategic and overarching approach, WA's native vegetation policy is characterized by: (Native Vegetation Working Group, 2000)

- Uncertainty for proponents and regulators
- Inconsistency within and between government agencies
- Inconsistent application of agreed national policy
- Lack of environmental outcomes

- Inefficient case by case assessment
- Application of native vegetation offsets without a policy framework

The current application of offsets in the absence of a policy and legislative framework, and the future development of such a framework, is the main focus of this thesis. Specific drivers for the development of policy in this area include:

- The lack of a consistent framework in the current EIA system that is leading to the application of a range of offset types without overall consistency of objectives and methodology.
- The introduction of the clearing permit provisions in the Environmental Protection Act Amendment Bill that focus the need for clear objectives in the assessment of native vegetation clearing and the requirement for and provision of offsets by proponents.
- The need to provide proponents of native vegetation clearing with information on government policy objectives and clear guidance on what offset types will be acceptable.
- The current Minister for the Environment signed the National Objectives and Targets for Biodiversity Conservation 2002-2005 (Environment Australia, 2001) which includes the objective of "reducing the national net rate of land clearing to zero by 2005". As legislation governing land clearing is primarily state based, this objective can only be achieved within each state /territory jurisdiction.
- Agreements that are currently in the process of negotiation between the State and Commonwealth government concerning the delivery of Natural Heritage Trust 2

(NHT 2) (Environment Australia, 2003) and the National Action Plan (NAP) (Waters and Rivers Commission, 2002).

Thus it can only be realistically achieved if each state and territory government adopt it as a state or territory native vegetation goal.

1.2 Research Question

In response to the situation summarized above, the research question for this thesis is as follows:

How can a native vegetation offset policy contribute to a 'no net loss' of vegetation quality and quantity?

In order to answer this research question, this dissertation has involved interviews with key policy makers in native vegetation management, and a literature review of environmental offsets, native vegetation offsets, Environmental Impact Assessment (EIA) process in WA and restoration ecology (detailed in Chapter Two).

Offsets for vegetation loss are a relatively new policy area, however wider environmental offset literature, including wetland banking, greenhouse gas and others, were used to gain insights from.

1.3 Overview of Thesis

This thesis contains six chapters. The first chapter introduces the research question and subject material and provides a context for the research question in regard to the existing legislative and policy framework for native vegetation. The second chapter explains the

research and design methods used to conduct this study. The third chapter is a review of some of the literature on environmental offsets both in Australia and elsewhere, native vegetation offsets in Australia, the restoration ecology of native vegetation in WA, and the Environmental Impact Assessment (EIA) process in WA. The fourth chapter presents a study and review of recent native vegetation offsets in Western Australia.

The fifth chapter presents the results and discussion based on interviews with key policy makers, the literature review and current and recent experience with offsets in WA. Chapter Six provides conclusions and recommendations for a future offset policy for native vegetation for WA.

1.4 Definition Of An Environmental Offset

An environmental offset is an action taken that is designed to compensate for, or mitigate against, the environmental impact of a specific action undertaken.

1.5 Definition Of An Offset Condition

An environmental offset condition is a binding and auditable condition attached to a regulatory approval that seeks to offset the adverse impacts of the development proposal. For example:

- Approval to clear native vegetation on one area of land may be given on the condition that an area of native vegetation with equivalent or greater conservation value is protected elsewhere;

- Approval for development activities that impact on threatened or endangered species in return for a conservation program implemented by the proponent that offsets those impacts or benefits the species.
- A carbon sequestration scheme allows emitters of carbon dioxide (CO_2) to offset their emissions against additional carbon absorbed and stored in vegetation.
- Approval of a new wastewater treatment facility may require that the proponent offset every additional kilogram of phosphorus discharged by a reduction of 3 kilograms of phosphorus loading from other sources.

1.6 What is No Net Loss

The term 'No Net Loss' derived originally from the Partnership Agreement for the Bushcare program under the initial Natural Heritage Trust program from 1996 to 2001 (NHT1). This agreement established a national goal *'to reverse the long term decline in the quality and extent of Australia's native vegetation cover'* (Natural Heritage Trust, 2002). This goal has since been commonly referred to as No Net Loss (Department of Land and Water Conservation, 2001).

The partnership agreement includes the following performance indicators (Natural Heritage Trust, 2002);

- The rate of native vegetation establishment in Australia exceeds the rate of vegetation clearance.
- Identification of endangered and other threatened ecological communities in regions which may be subject to clearing.

1.6 What is Net Conservation Benefit

The term ‘net conservation benefit’ has been used recently in Western Australia and is worthwhile considering in terms of discerning its relationship with offsets.

The Gorgon Venture describes net conservation benefits as being introduced in the mid-1980’s, in relation to mining in National Parks (Gorgon Australian Gas, 2003). In regard to Barrow Island, the Gorgon Venture has proposed to establish the ‘Gorgon Environment Foundation’ to coordinate a range of significant conservation benefits that are related to the conservation values of Barrow Island (Gorgon Australian Gas, 2003).

The Environmental Protection Authority (EPA) described net conservation benefits as being distinct from the necessary management, protection, insurance and offset measures in relation to the recent Gorgon Gas Venture for Barrow Island (Environmental Protection Authority, 2003c). No definition of net conservation benefits is currently available, but it is clear from the above EPA statement that net conservation benefits, in the EPA’s view, are over and above impact management and offsets.

Chapter Two Research Design and Methods

2.0 Introduction

This chapter outlines the research design and methods guiding this project. Results and discussion are included in Chapter Five, and conclusions and recommendations of the research are included in Chapter Six.

2.1 Literature Review

A literature review (see Chapter Three) was conducted to gain an insight into environmental offsets, native vegetation offsets, native vegetation restoration in Western Australia and the Environmental Impact Assessment (EIA) process. The goals of this literature review include (Neuman, 2000):

- Demonstrate familiarity with the current knowledge in this area and establish credibility for the research outcomes.
- Show the path of prior research and how this current project is linked to it.
- Integrate and summarize what is known in this area.
- Learn from others and stimulate new ideas.

2.2 Recent Examples of Offsets in Western Australia

Data was also collected through collating examples of recent offsets in Western Australia via the Environmental Protection Act, 1986 (WA) assessment process (see Chapter Four). In total, 18 offset examples were used, including wetlands, native vegetation and nutrient offsets.

2.3 Structured Interviews

Interviews formed an additional data source and provided an insight into the issues and rationale of developing native vegetation offset policies. The author and the author's supervisors identified a number of policy people who had direct experience in native vegetation offsets (NSW and Victoria), or who would make a contribution to a native vegetation offsets policy in Western Australia once the policy or framework for native vegetation offsets is developed. The results of the interviews are in Chapter Six, the questions for the interview are listed in Appendix 2, and the list of respondents is listed in Appendix 1.

2.3.1 Research Design and Methods for Structured Interviews

To answer the research question, 'How can a native vegetation offset policy contribute to a 'no net loss' of vegetation quality and quantity', a qualitative research approach based on structured interviews was used. Using qualitative research methods (Babbie, 1990, Frankfort-Nachmias and Nachmias, 1992, Neuman, 2000) this study was designed to ascertain the views and thoughts regarding native vegetation offsets from natural resource professionals and conservation agencies. Other groups, including industry groups, professional groups and other interests were not included because of time and resource limitations. However, it is acknowledged that these groups have an important role to play in any future offsets framework.

Qualitative research, as a method of data collection and analysis, can be understood as enhancing the data so it is possible to see key aspects of the study more clearly (Ragin,

1994). Qualitative research can focus on interactive processes and events, is situationally constrained, can involve few cases or respondents, has high researcher involvement and utilizes thematic analysis (Neuman, 2000).

This study uses a purposive sampling technique. The purposive sampling technique selects sampling units (interviewees) in a subjective manner by an expert (Frankfort-Nachmias and Nachmias, 1992). The 'expert' in this case is the author and the author's supervisors. Selecting a sample of respondents based on knowledge and expertise in the research area is seen as appropriate (Babbie, 1990).

The purposive sampling method is a useful mechanism to gain in-depth information about a particular group. The purpose is to generalize more to the sampled group(s), than it is to generalize to a larger population (Neuman, 2000).

Therefore, the approach taken was to choose respondents for a specific purpose (Neuman, 2000). The objective was to choose respondents who have experience in native vegetation offset policy development, and/or have contributed to native vegetation policy development.

Three groups were identified. The first group consisted of policy makers from government agencies who had developed native vegetation offset policies (NSW and Victoria). The second group consisted of people who contribute to native vegetation policy from non-government organizations (NGO's) in NSW, Victoria and WA, and the

third group consisted of policy makers from government agencies in Western Australia who would make a contribution to a future native vegetation policies, including a native vegetation offset policy.

It is worth noting that group labels are not especially powerful for making inferences about the group members because the groups are not mutually exclusive and because there is often a wide range of opinions within a group as there is between groups (Hull *et al.*, 2002).

The policy makers and contributors to policy development represent a subset of policy actors in the native vegetation policy community. The sample is used to gain an overall view of issues within the native vegetation policy area, and in particular within the native vegetation offset policy area.

2.3.2 Research Methods

The majority of the data collected through the research came from a literature review of published information on environmental offsets and native vegetation offsets. Interviews formed an additional data source and provided an insight into the complexities and rationale of developing native vegetation offset policies.

2.3.3 Interviews

The study used face-to-face interviews based on directed, open-ended questions. Additionally, probing was used to motivate the respondent to elaborate or clarify

responses, as well as explain the reasons behind the answer. Probing also assists in focusing the conversation on the specific topic of the interview (Frankfort-Nachmias and Nachmias, 1992).

The interviews were carried out in NSW and Victoria in November 2002, and the Western Australian interviews were carried out between April and July 2003. All interviews were taped to allow the author to listen and ask additional probing questions, as well as ensuring a complete record of the interview was available for transcribing. Each interviewee was interviewed once, and in two cases in Victoria, interviewees suggested another person from the same organization attend the interview to clarify issues. In both cases, where two people were interviewed, the two interviewees were closely involved in the development of native vegetation offset policies. All taped interviews were transcribed verbatim soon after being completed.

The questionnaires and research process gained approval from Murdoch University's Human Ethics Committee in October 2002.

Interview questions 1 to 4 aimed to clarify the ecological principles underpinning a native vegetation offsets policy (Questions 1 to 4, Appendix 2). The questions sought to examine issues of quality, extent and decline of native vegetation in relation to the offset mechanism, and whether offsets should be based on a case-by-case basis or through ratios common across the state.

Question 5 (Appendix 2) asked respondents to ascertain who will take up the opportunity to use the offset mechanism. This question aimed to determine if capital-intensive projects are more likely than less capital-intensive projects to take up offset opportunities.

Questions 6 - 8 (Appendix 2) attempted to determine the administrative implications of an offset policy/framework, in terms of assessment, management and financial responsibility.

Question 9 (Appendix 2) asked respondents if they think offsets are a mechanism for 'sanctioning' vegetation loss, in relation to criticism from peak environment groups regarding offset mechanisms.

Question 10 (Appendix 2) was designed to establish background information on the respondent, regarding academic qualifications and experience in native vegetation policy development.

A total of 10 respondents (Appendix 1) were initially contacted by telephone and were asked to participate in the interviews. A research plan of the project was given to the respondent as well as a copy of the questionnaire. The formal requirements of Murdoch University's Ethics Committee were also completed. After the potential respondent agreed to participate in the study, a mutually convenient meeting time was agreed to.

2.3.4 Data Analysis

Two complementary analytic approaches were undertaken to analyze the data (Moore and Renton, 2002). Firstly, because of the small sample size, the data were analyzed as percentages rather than statistics, because statistics would not have produced meaningful outcomes. Secondly, a qualitative assessment methodology of the transcribed interview was used. This is also known as coding and is a widely accepted approach in qualitative data analysis (Frankfort-Nachmias and Nachmias, 1992; Neuman, 2000; Babbie, 1990).

To analyze the data, the responses to the questions were analyzed individually, than coding was used to highlight themes and patterns in responses. Theme identification evolved through repeated analysis of the original transcripts. The coding is guided by the research question, and it frees the researcher from entanglement in the details of the raw data and encourages higher-level thinking about emergent themes and issues. It also moves the researcher towards theory and generalizations (Neuman, 2000).

For example, question 1, regarding knowledge of vegetation quality and quantity and use of the offset mechanism, highlighted issues which were not pre-determined by the researcher, including the concept that ‘no net loss’ should be abandoned because it cannot be ever be realistically achieved.

2.3.5 Validity and Reliability

Validity

The problem of validity arises in social science research because measurement is indirect, and researchers are never completely sure they are measuring what they intend to measure (Frankfort-Nachmias and Nachmias, 1992). Therefore the researcher must provide supporting evidence that a measuring instrument does measure what it is intending to measure. To this end, three basic kinds of validity can be distinguished: internal validity, external validity and construct validity (Neuman, 2000).

Internal validity means there are no errors internal to the design of the research project. Neuman (2000) listed 10 common threats to internal validity. One of threats is selection bias, and is relevant to this research paper because of the purposive selection of respondents. In order to minimize this threat of selection bias, constant referral to the research question was undertaken in order to ascertain that potential respondents selected formed equivalent groups. Because all the respondents were involved in formulating or contributing to native vegetation policy, this bias was reduced. The major difference between respondents was the different philosophical and attitudinal outlooks of the organizations they represented. The conservation NGO's, for instance, could have an arguably 'greener' perspective than government agency respondents who by definition had to balance broader social and economic considerations when considering native vegetation policy development.

External validity is the ability to generalize findings from a specific setting and small group to a broad range of settings and people (Neuman, 2000). However, the aim of this study, utilizing purposive sampling, is not to generalize to a wider population but only to the sampled groups.

Construct validity involves relating a measuring instrument to a general theoretical framework in order to determine whether an instrument is tied to the concepts and theoretical assumptions that are employed (Frankfort-Nachmias and Nachmias, 1992). To reduce the threat of construct invalidity, a number of different sources of information and documentation were used through the literature review to augment and support the questionnaire.

Reliability

Reliability refers to whether or not the study is consistent and reasonably stable over time. Reliability also refers to the repeatability of the work, as to whether different researchers utilizing the same or different methods can repeat the same outcomes (Frankfort-Nachmias and Nachmias, 1992). To achieve reliability, this study has been well documented throughout the research process, including a research plan, methods and design to allow other researchers to repeat the research.

Chapter Three Literature Review

3.0 Introduction

This Literature Review will be divided into four areas; environmental offsets, native vegetation offsets, restoration ecology in Western Australia and the Western Australian environmental impact assessment (EIA) process. These areas have been chosen because of their importance in:

- Gaining an overview of existing and proposed environmental offsets in Australia and overseas.
- Understanding native vegetation offsets in other states in Australia.
- Determining the restorative abilities of Western Australian vegetation in regard to using restoration as an offset.
- Determining how offsets can be used within Western Australia's EIA process.

3.1 Environmental Offset Programs

Offset policies for environmental purposes have gained more attention in recent years. Offsets have been utilized for pollution control, mitigation of wetland losses, protection of endangered species and impacts on native vegetation. This part of the literature review will determine the type and effectiveness of environmental offsets and what lessons we can draw from them for a proposed native vegetation offset framework in western Australia.

3.1.1 Wetland Banking in the United States

The concept of wetland banking, as it operates in the United States, allows a developer or landholder to alter the environmental values of a wetland if they purchase the credits

earned by another party for the protection or restoration of another wetland. These credits are traded through an intermediary known as a wetland bank.

Under the U.S. Clean Water Act (1972) Section 404(b) and the U.S. Army Corps of Engineers (Corps) regulations, the Corps is obligated to require mitigation (i.e., compensation) for any unavoidable impacts on a wetland as a condition of permit approval.

The developer can be required to enhance, restore, or create wetlands on or near the development site. Mitigation projects are meant to replace, on at least a one-to-one basis, the lost functions and values of natural wetlands affected by development activities.

Recently, a number of studies have been conducted to determine the effectiveness or otherwise of wetland banking in the United States. Field surveys and other reports of permitted mitigation sites have identified a number of issues in the wetland banking process (Adler, 1999; Kentula *et al*., 1992; Young *et al*., 1996). These include:

1. 1. Regulatory agencies have allowed the substitution of unlike types of wetlands in mitigation or require less-than-equal quantities of mitigation.
2. 2. Proponents frequently do not construct wetlands, construct insufficient area of wetlands, or construct wetlands otherwise out-of-compliance with the design specified in their permit.
3. 3. Constructed wetlands frequently do not function as anticipated.
4. 4. Regular agency-conducted compliance monitoring is often inconsistent or cursory

5. 5. When complex wetlands are affected (i.e. wetlands which may have many ecological functions and processes), they are replaced by different, simpler wetland types through mitigation programs.

Another study into wetland offsets was undertaken in 2001 by the Committee on Mitigating Wetland Losses (Natural Research Council, 2001). The Committee reviewed case examples, consulted with various experts, undertook extensive review of scientific literature and examined many government reports and data on wetland mitigation projects. The Committee had five key principle findings that summarized the state of wetland mitigation in meeting the national objectives:

i. i. The goal of no net loss of wetlands is not being met for wetland functions by the mitigation program, despite progress in the last 20 years.

ii. ii. A watershed approach would improve permit decision making.

iii. iii. Performance expectations in Section 404 (wetland mitigation) permits have often been unclear, and compliance has often not been assured nor attained.

iv. iv. Support for regulatory decision making is inadequate.

v. v. Third party compensation approaches (mitigation banks, in-lieu fee programs) appear advantageous over permittee responsible mitigation.

A smaller study looked at 24 wetland mitigation sites in the state of Washington (Johnson *et al.*, 2002) and used the following criteria to evaluate the success of mitigation projects: Achievement of ecologically relevant measures:

- Establishing the required acreage of mitigation.

- Attaining ecologically significant performance standards.
- Fulfilling appropriate goals and/or objectives.

Adequate compensation for the loss of wetlands:

- Contribution of the mitigation activity to the potential performance of functions.
- Comparison of the type and scale of functions provided by the mitigation project with the type and scale of lost wetland functions.

In addition to evaluating the success of mitigation projects, the study also examined:

- Wetland resource trade-offs (e.g., in-kind/out-of-kind, on-site/off-site, etc.).
- Ecological condition (e.g. surrounding land uses, buffer condition, extent of invasive species, etc.).
- Factors that were associated with project success (or lack of success).

Of the 24 projects, based on these criteria only, three projects (13%) were found to be fully successful, eight projects (33%) were moderately successful, eight (33%) were minimally successful; and five (21%) were not successful.

Further to this, only 65 percent of the total acreage of wetlands lost was replaced by creating or restoring new wetland area, thereby resulting in a net loss of 24.18 acres of wetland area. No enhancement projects were fully successful, while eight out of nine (89%) enhanced wetlands were minimally or not successful. Nearly two-thirds of the total acreage of mitigation that was established resulted from enhancement activities.

According to (Johnson *et al.*, 2002), follow up by regulatory agencies, monitoring and maintenance results in more-successful wetland offset projects. Additionally, the authors recommended the development of a compliance tracking system and the provision of guidance by regulatory agencies to improve mitigation at every step of the process, from choosing an appropriate site to monitoring and performing site maintenance.

In addition to the aforementioned compliance, monitoring and maintenance issues, a major concern for US wetland banking schemes has been the high level of scientific uncertainty associated with wetland banking (Murtough *et al.*, 2002).

It has been difficult to ensure a no net loss of wetland value and function when replacing one wetland with another. US schemes have tried different approaches to address scientific uncertainty.

Firstly, some schemes have required offset activities to occur before impact on the permitted wetland occurs. This has been attempted to ensure the proposed offset actually results in a viable wetland because of the relative high failure rate of recreated value and function in artificial and restored wetlands (Adler, 1999; Kentula *et al*., 1992; Young *et al*., 1996), and the substantial risk of significant harm if wetlands are destroyed before effective and sustainable offset credits have been generated.

Secondly, typical offsets are required in the same biotic and hydrological basin. This increases the chance for like for like tradeoffs being made.

Thirdly, a conservative ratio is used to specify the exchange rate at which wetland destruction must be offset by wetland improvements. For example, an offset ratio may require 2 hectares for 1 hectare of destroyed wetland, and/or additional offsets required if endangered species or a strategic area is to be impacted.

3.1.2 Wetland Banking in Western Australia

The Environmental Protection Authority (EPA) of Western Australia released a draft policy framework for the establishment of wetland banking instruments (Environmental Protection Authority, 2001b). Within this draft policy, wetland loss mitigation refers to the restoration, enhancement, creation or, in exceptional circumstances, offsetting impacts through the conservation of other wetlands so as to compensate for the impacts which are anticipated (Environmental Protection Authority, 2001b).

Since 1991, the EPA generally recommends that where a significant wetland loss is unavoidable, the proponent be required to replace wetland areas and functions lost as a result of the development (Environmental Protection Authority, 2001b). The types of wetland loss mitigation includes restoration or re-establishment, creation of new wetlands, enhancement of existing wetland functions and conservation of high quality wetlands to mitigate for destruction of others (Environmental Protection Authority, 2001b).

Some of these examples have been included in Chapter Four. This draft policy framework, however, has not been adopted.

3.1.3 United States Clean Air Act (1970) - New Source Review program

Under the Clean Air Act Amendments of 1970, the US Environmental Protection Authority (EPA) assumed principle authority from individual states for controlling air pollution. All conventional air pollutants have primary standards designed to protect human health.

Congress established the New Source Review (NSR) program as part of the 1977 Clean Air Act Amendments and slightly modified it in the 1990 Amendments. NSR was designed to improve air quality in areas with air quality problems, and protect air quality in areas where it is good (US Environmental Protection Agency, 2003).

The US EPA New Source Review (NSR) program aims to minimize pollution from large new and modified developments that could impact on regional air quality. In regions that do not meet National Ambient Air Quality Standards (NAASQS), called non-attainment areas, new developments must provide or purchase offsets to compensate for the increase from the new or modified source (US Environmental Protection Agency, 2003).

If an owner or operator of a pollution source wants to release more of an air pollutant, an offset must be obtained so that permit requirements are met. An offset in this case is a reduction of the air pollutant by an amount greater than the planned increase.

The company must also install tight pollution controls. An increase in a air pollutant can be offset with a reduction of the pollutant from some other stack at the same plant or at another plant owned by the same or some other company in the nonattainment area. Since total pollution will continue to go down, trading offsets among companies is allowed. This is one of the market-based approaches to cleaning up air pollution in the Clean Air Act (US Environmental Protection Agency, 2003).

However, there have been some problems in delivering this offset program and subsequent environmental benefits.

EPA's study of the NSR program has shown that it has an adverse impact on investment in expanding and preserving capacity, as well as in energy efficiency. It found that investment is hindered by regulatory uncertainty and lack of flexibility resulting from the program's complexity, and the added costs and delays imposed by the NSR process – the NSR permit process can add a year or more to the time needed to review proposed plant modifications, and cost over $1 million. As a result, many companies delay or abandon plans to modernize their facilities in ways that would benefit the environment (US Environmental Protection Agency, 2003). Furthermore, the EPA believes many sources have illegally avoided obtaining required NSR permits, and has launched a focused enforcement effort (Bassett, 2000).

3.1.4 United States Endangered Species Act 1973 – Habitat Conservation Plans (Offsetting impacts)

Section 10(a)(1)(B) of the United States Endangered Species Act (1973) allows The US Fish and Wildlife Service to issue permits for the "take" of federally listed endangered

species if the taking will be incidental to, and not the purpose of, an otherwise lawful activity. Congress intended that section 10(a)(1)(B) process be used to reduce conflicts between listed species and private development and to provide a framework that would encourage "creative partnerships" between the private sector and local, State, and Federal agencies in the interests of listed species and their habitat (Northern Prairie Wildlife Research Center, 2003).

To obtain an "incidental take permit," an applicant must submit a Habitat Conservation Plan (HCP) that describes how the applicant will minimize and mitigate the impacts of the taking and how HCP implementation will be funded.

An HCP allows development activities that impact threatened or endangered species in return for a conservation program implemented by the permittee that offsets those impacts or benefits the species.

HCPs vary greatly in size and complexity, covering anywhere from a few acres to statewide efforts. The US Fish and Wildlife Service's role in the habitat conservation planning process is to provide technical assistance to the applicant during the HCP development phase, review the permit application and HCP, and issue the permit if all requirements have been satisfied.

Examples of recently completed HCPs include the Simpson Timber Company HCP for the northern spotted owl in northern California (1992), the International Paper HCP for the Red Hills salamander in Alabama (1993), and the Metropolitan Bakersfield HCP for the San Joaquin kit fox and other species in California (1994). Each of these HCPs involves relatively large planning areas (30,000 to 380,000 acres) and allows economic

activities (e.g., timber harvest or residential development) to proceed in endangered species habitat.

Each plan also requires that sufficient habitat be protected, through set-aside or acquisition, to offset project effects on listed species (Northern Prairie Wildlife Research Center, 2003).

However, reviews of HCP's find that the benefits to endangered and threatened species were limited at best, or have irreversible impacts on the species they are designed to protect (Bingham and Noon, 1997., Hall, 1997).

It was found that HCP's frequently violate the spirit and letter of various Endangered Species Act and National Environmental Policy Act provisions, including requirements to:

1. 1. Document and quantify impacts to each affected species.
2. 2. Assess cumulative impacts.
3. 3. Address each unlisted species as if it were already listed.
4. 4. Minimize and mitigate impacts to species to the maximum extent practicable.
5. 5. Avoid harming species' chances of recovery.

6. 6. Avoid harming species' critical habitats, including areas needed for recovery.

7. 7. Consider the full range of alternatives.

8. 8. Provide assurances the plans will be implemented.

Hall (1997) writes, "*Put simply, HCP's often rely upon conservation measures which lack credibility, which are arbitrary, or which simply do not appear sufficient to offset the impacts of timber operations and other land management activities*".

3.1.5 3.1.5 Ecological Offsets in The Netherlands

Another example of offsets is in The Netherlands. In the 1980's and 1990's several Dutch policies were established to regulate nature conservation aspects of development projects. Until 1993, application of compensation measures was optional in the Netherlands. With the publication of the National Structure Plan for Rural Areas the compensation offset principles came into force (Cuperus *et al.*, 2001)

Offset habitat creation is achieved primarily through land acquisition, adaptive design and subsequent management of, mainly, farmland. Implementation of the offset measures is not a regulatory requirement, but rather, through agreements between the government and proponent (Cuperus *et al.,* 2001).

The Netherlands offset principle is to be applied if any of the following types of areas are impacted on in ecological terms: core areas of the Dutch National Ecological Network, nature development areas created as part of the National Ecological Network, nature

areas in regional plans or zoning plans and areas covered by the Nature Conservation Act (1967) and Forestry Act (1961).

The National Structure Plan for Rural Areas incorporates the following criteria in regard to offsets (Cuperus *et al.*, 2001);

1. The initiator is responsible for applying the compensation principle.
2. The legitimacy of the development must first be established before addressing the compensation measures.
3. The occurrence of impacts is to be avoided as far as possible, with any effects preferably being mitigated and, only in the last resort, compensated for.
4. Compensation implies the no net loss of area or quality.
5. If physical compensation is unfeasible, financial compensation is obligatory.

Cuperus et al; (2001) studied ecological compensation in relation to Dutch highway planning and found that the principles and criteria were consistently applied to a number of projects. However, it was found the second criterion, whether the project is legitimate or not, in terms of which route the highway will take, complicated the process for deciding on the extent and type of the offset.

It was recommended that the legitimacy of the project be decided first, based on a comparison of ecological and transport issues of each transport route. This would mean the compensation process would not become entangled in debates over legitimacy, and provide for clearer and better ecological outcomes (Cuperus et al; 2001).

3.1.6 Aquatic Habitats in New South Wales

New South Wales (NSW) Fisheries, under the NSW *Fisheries Management Act* 1994, has recently been strengthened with the inclusion of Threatened Species Conservation provisions to protect and enhance aquatic habitats (Government of New South Wales, 2002).

NSW Fisheries has a policy of 'no net loss' for developments that damage aquatic habitat. Developers can compensate for damage by:

- transplanting seagrass or constructing fishways, or
- making payments into a Conservation Trust Fund used for strategic rehabilitation projects throughout NSW waters.

A monetary bond may be required as insurance against the offset action failing. For example up to $250,000 per hectare for seagrass. Habitat compensation is calculated on a 2:1 basis for vulnerable habitats. Consent conditions require an annual progress report for the offset action (Government of New South Wales, 1999).

Evaluation of the offset and environmental compensation activities has not yet been conducted. However, NSW Fisheries view the compensation activities as working well and achieving targets and evaluation will be conducted in 2004 (Copeland, C. 2003, pers. comm., 26 June).

3.1.7 Green Offsets for Sustainable Development Concept Paper (NSW)

In April 2002, the NSW Government released for public consultation the ‘Green offsets for sustainable development Concept Paper’ (Government of New South Wales, 2002). The Concept Paper presents the concepts underlying green offsets, and introduces three trial pollution offset initiatives that will be developed through 2002. The principles outlined in the Concept Paper include (Government of New South Wales, 2002);

- “*Environmental impacts must be avoided first by using all cost-effective prevention and mitigation measures. Offsets are then only used to address remaining environmental impacts.*
- *All standard regulatory requirements must still be met.*
- *Offsets must never reward ongoing poor environmental performance.*
- *Offsets will complement other government programs.*
- *Offsets must result in a net environmental improvement.*

Offsets must be:

- *enduring - they must offset the impact of the development for the period that the impact occurs*
- *quantifiable - the impacts and benefits must be reliably estimated*
- *targeted - they must offset the impacts on a 'like for like or better' basis*
- *located appropriately - they must offset the impact in the same area*
- *supplementary - beyond existing requirements and not already being funded under another scheme*

- *enforceable - through development consent conditions, licence conditions, covenants or a contract*".

The Concept Paper stated also that offsets can achieve environmental improvements at lower cost than regulation. Offsets can allow resources to be used where they can achieve the greatest environmental improvement. Additionally, it may not be economically feasible to ensure that a development site does not impact on the environment, because most developments will impact on the environment after all cost effective mitigation measures are undertaken.

The cost of reducing environmental impact increases as the project approaches zero additional impact (the law of diminishing returns). At some point the cost of further on-site mitigation is greater than the value to the environment. Stricter controls will increase the cost of the development, but may only provide limited gains for the environment, as demonstrated below in Figure 3.1 (Government of New South Wales, 2002).

Figure 3.1 Costs of reducing Environmental Impacts (Government of New South Wales, 2002)

Environmental impact reduction	100% (No impact)

Three pilot schemes will demonstrate how pollution offset will work in practice.

The pollution offset schemes will be designed to (Government of New South Wales, 2002);

1. reduce water pollution in the lower Hawkesbury-Nepean River (the South Creek pilot)

2. reduce water pollution in the drinking water catchments of Sydney and adjacent regional centres

3. reduce air pollution in the greater metropolitan area.

At the time of writing, no additional information is available on these three trial offset schemes. Also, no public submissions are available for public examination at this time.

3.1.8 Carbon Sequestration Credits

A carbon sequestration credit scheme allows emitters of carbon dioxide (CO_2) to offset their emissions against additional carbon absorbed and stored in vegetation. The intention is to reduce the net increase in CO_2 in the atmosphere and therefore minimize climate change. Vegetation is referred to as a carbon sink (Murtough *et al.*, 2002).

At this stage, no organized sequestration projects have been implemented, this is due to the political uncertainty regarding a global agreement on greenhouse gas reductions.

However, a number of demonstration projects have been used to test the effectiveness of carbon sequestration credits. The Tokyo Electric Power Company (TEPCO) and Hancock New Forests Australia signed a contract to engage in carbon offset trading. TEPCO purchased the right to the carbon content (and associated carbon sequestration credits) of Hancocks 150 000 hectare plantation forest in Victoria ((Murtough *et al.*, 2002)

To ensure increased certainty in carbon offset trading, the National Carbon Accounting System (NCAS) has built an integrated system for carbon accounting for Australia's land-based sources and sinks. The NCAS is also working towards establishing a method for quantifying sequestration and providing a transparent and verifiable reporting method for sequestration in carbon sinks (Farrelly, 2002).

Additionally, a Cooperative Research Centre (CRC) for Greenhouse Accounting was established in 1999 to address scientific uncertainty in determining the amount of carbon

stored in woody vegetation. The CRC will also investigate the permanence of the carbon capture, because forestry projects tend to be temporary in nature and CO_2 captured during forest growth is potentially released upon harvest (Murtough *et al.*, 2002).

3.1.9 Conclusions From Analysis Of Environmental Offset Initiatives

The above environmental offset initiatives demonstrate a number of factors that need to be acknowledged when considering native vegetation offsets. These include:

1. Use of offset measures that are credible to achieve realistic ecological goals.
2. Establishing legitimacy of the project before discussion of a suitable offset arrangement.
3. Additional resourcing of regulatory agencies to ensure offset objectives and targets are met.
4. Monitoring of projects be conducted thoroughly
5. Regular maintenance of offset by proponent.
6. Development of a compliance tracking system to ensure ready and transparent evaluation of offsets,
7. Use of the precautionary principle in regard to scientific uncertainty to minimize potential problems.
8. Regulations governing offsets should not jeopardize potential environmental outcomes by being too complex or inflexible.

3.2 Native Vegetation Offset Schemes

This section of the literature review will analyze specific native vegetation offset schemes to determine the effectiveness of the schemes and determine what lessons we can draw from them in relation to Western Australia.

3.2.1 New South Wales Native Vegetation Offset Scheme

In 2001, the New South Wales Government, through the Department of Land and Water Conservation (DLWC), released a Discussion Paper entitled 'Offsets, Salinity and Native Vegetation: Discussion Paper' (Department of Land and Water Conservation, 2001). The paper examines whether, and how, the negative impacts of clearing native vegetation might be offset by separate actions that have positive impacts. Offset actions could include improving the management of existing native vegetation, restoring or regenerating an area of degraded vegetation, or revegetating a previously cleared area.

The major principles include (Department of Land and Water Conservation, 2001)

- "*The offset should be consistent with relevant Government policies.*
- *An offset should lead to a net gain that improves the condition of the environment.*
- *An offset agreement should not lead to permanent environmental costs, due to the delay before offset actions yield environmental benefits.*
- *Clearing should only proceed when the offset site is making acceptable progress towards the predicted ecological state and management arrangements are legally secure*".

The Discussion Paper identifies obstacles and solutions to the introduction of an offset policy, including (Department of Land and Water Conservation, 2001);

- "*Lack of accurate and sufficient data on native vegetation (possible solutions are further research and an incremental introduction of the policy).*
- *Changing Government policy (a possible solution is announcing that targets and other measures apply for a specified period).*
- *Legal obstacles (The NSW Native Vegetation Act would require amendments to enable an offset policy)*
- *Costs in administrating an offset scheme (possible solutions are introducing a simple scheme in regions with good data, and the government bearing all the transaction costs during an establishment period)*".

A system of tradable credits and debits has been proposed that would be calculated on native vegetation criteria, including habitat structural diversity, topographic complexity, presence of weeds, species richness and the uniqueness of a particular site.

It has been identified by the Discussion Paper that the method for calculating credits and debits must recognize the complexity of natural ecosystems, yet be simple to apply. This is one of the key challenges of the offset policy (Department of Land and Water Conservation, 2001).

To assist in defining equivalent units of clearing and replacement, the Discussion Paper proposed that the impact of clearing be described as a set of debits rather than a single debit (for example, the loss of x hectares of structurally complex habitat and y hectares of weed free vegetation and z units of salinity control). Offset actions would need to adequately replace all of these units, although a single area could contribute a number of values simultaneously (Department of Land and Water Conservation, 2001)

The following advantages of an offset market are also canvassed by the Discussion Paper (Department of Land and Water Conservation, 2001):

- "*Potential for increased regional development opportunities from new agricultural enterprises*
- *Potential to diversify farm incomes through earning credits for positive vegetation management*
- *More effective and cost-effective remediation measures (by allowing offset actions to occur anywhere within a defined boundary, remediation could occur at the site of greatest environmental benefit, least risk and least cost*".

The 'Offsets, Salinity and Native Vegetation: Discussion Paper' (Department of Land and Water Conservation, 2001) has generated substantial comment from a number of groups, including the Australian Conservation Foundation ACF), Nature Conservation Council of NSW (NCC) and the NSW Farmers Association.

The Australian Conservation Foundation (ACF) has great concerns over the development of an offsets system for native vegetation (Australian Conservation Foundation, 2001). The ACF states the reasoning for developing an offset system is flawed, as the underlying basis is to facilitate land clearing, rather than rectifying existing problems with land clearing. Further to this philosophical position, the ACF also states (Australian Conservation Foundation, 2001):

- "*Offsets will never recover the cost of damage by land clearing, because the enhancement of biodiversity values on already cleared land takes considerably more time and energy than protecting existing native vegetation.*
- *Offsets decrease biodiversity because there is no scientific evidence that suggests that humans can recreate complex ecosystems by clearing intact vegetation and replacing it with revegetated bushland.*
- *ACF has seen no evidence that offsets would be of assistance in arresting land degradation by creating a market for credits.*
- *In the absence of adequate baseline data, it will be difficult establishing an adequate offsets system for native vegetation.*
- *Current lack of an effective compliance system under the NSW Native Vegetation Act will be further exposed by an offset system which will require adequate resourcing and compliance to ensure satisfactory vegetation outcomes*".

The NSW Farmers Federation (NSWFF) also responded to the 'Offsets, Salinity and Native Vegetation: Discussion Paper' (Department of Land and Water Conservation,

2001) in 2001. In general terms, the NSWFF believes that offsets have the potential to become an important tool in the management of land resources in NSW (NSW Farmers Association, 2001). However, the NSWFF notes the Discussion Paper is based, in their view, on a number of flawed principles that ensure that farmers (being one section of the community) bear the brunt of native vegetation conservation in NSW, regardless of whether the benefits from this conservation accrue to themselves or the public (NSW Farmers Association, 2001).

The NSWFF also made specific comment regarding the proposed principles of the Discussion Paper (NSW Farmers Association, 2001), including;

Principle 1 - An offset policy should be consistent with relevant Government policies.
The NSWFF states the principle has little purpose and is unduly restrictive because Government policies change over time, are not sacred and there is no justification to restrict the discussion on offsets to existing policy as this may stifle innovation. Used properly, an offset instrument could transform policy and this possibility must not be discounted so early in the discussion.

Principle 2 – An offset should lead to a net gain that improves the condition of the environment.
The NSWFF has a strong aversion to this principle because farmers are already restricted in the management of their land, with no recompense for the delivery of public good conservation. Offsets should not demand additional contributions from landholders.

Also, the restrictive interpretation of the Precautionary Principle adopted by the Discussion Paper represents a misuse of the concept. The Precautionary Principle, according to the NSWFF, is aimed at preventing inaction due to lack of perfect knowledge. However, the underlying assumption in this Discussion Paper is that the best way to protect biodiversity is to do nothing to manage the land unless we can prove that management is beneficial.

NSWFF submitted that a more sensible approach would be to encourage adaptive management actions that promote healthy, sustainable and productive landscapes in the medium to long term.

Principle 3 - An offset agreement should not lead to permanent environmental costs due to the delay in before offset actions yield environmental benefits.

The NSWFF has reported that this principle is flawed on the grounds that nature cannot be accurately predicted and this in turn leads to an overly restrictive offset policy. Habitat that is threatened is already well protected under the Threatened Species Conservation Act. Given this protection, there is little risk in adopting an approach that reflects the likelihood that some offset arrangements will exceed expectations and that others will disappoint. What is required is a net balance.

To demand that each individual offset succeeds and that risk margins be included, defies common sense, according to the NSWFF. Some will fail and some will exceed expectations but so long as there is an overall balance in the end the offsets will be a success.

Principle 4 - Clearing should only proceed when the offset site is making acceptable progress towards the predicted ecological state and management arrangements are legally secure.

The NSWFF agrees with this principle as long as it is not too stringently applied. The NSWFF argues that the site should be earmarked and fenced or planted, depending on what management actions necessary. However, it would be unacceptable that clearing should only proceed when the offset site is making acceptable progress towards the predicted ecological state.

A more practical approach, according to the NSWFF, would be to institute the appropriate management arrangements on the land in question and to accept that there is little certainty in nature.

Also, the issue of legal security is a critical one. If farmers are to embrace an offset approach then there must be flexibility in the duration of agreements. In the USA, The Nature Conservancy have found shorter-term covenant agreements of 5 to 7 years to be effective in involving farmers in active conservation. This may not ensure that vegetation is permanently retained but the additional risk could be offset with area. Farmers will be unlikely to sign away development rights to their properties indefinitely under a scheme such as this (NSW Farmers Association, 2001).

The Nature Conservation Council (NSW) of NSW proposes that an analysis of the offsets scheme within the Discussion Paper should be based on asking the following key questions (Nature Conservation Council of NSW, 2001):

1. *"Does the offsets scheme promote avoidance of clearing?*

2. *Does the offsets scheme prevent inappropriate clearing?*

3. *Is the offsets scheme consistent with ESD?*

4. *Does the offsets scheme provide a precautionary approach?*

5. *Will the offsets scheme result in 'No Net Loss'?*

6. *Does the offsets scheme increase biodiversity values?*

7. *Does the offsets scheme promote sustainable agriculture?*

8. *Can the offsets scheme work in the present monitoring and compliance regime of DLWC?*

9. *Does the offsets scheme promote fundamental changes in behaviour and resource use?"*

1. Does the offsets scheme promote avoidance of clearing?

The NCC states the answer to the first question is 'no', because the basis of the Discussion Paper is to provide increased flexibility for clearing, rather than avoidance.

2. Does the offsets scheme prevent inappropriate clearing?

Although the Offsets Paper suggests that an offsets scheme could define boundaries where clearing was not to occur, the underlying assumption is that clearing, where a feasible 'offset' could be provided, could still occur. The NCC believes that by focusing on facilitating clearing, rather than on the appropriateness of the original clearing proposal, the offsets scheme is not in accordance with the object of the NSW Native

Vegetation Conservation (NVC) Act (Section 3(f)) which is to prevent the inappropriate clearing of vegetation.

3. Is the offsets scheme consistent with ESD?

The offsets scheme is based, according to the NCC, on the assumption that development is 'necessary' and that native vegetation management is a question of 'compromises and trade-offs'. This narrow focus and lack of broader objective, makes this scheme conflict with the Ecologically Sustainable Development (ESD) underpinnings of the NVC Act.

4. Does the offsets scheme provide a precautionary approach?

THE NCC reports that a core component of ESD is the precautionary principle. The NCC state this about the precautionary principle in relation to the NVC Act:

" It is a method of decision-making that must be adopted where the threshold has been met — namely, that there are threats of serious or irreversible environmental damage. Where the threshold has been met, the burden is on the applicant to produce material which removes scientific uncertainty about whether those consequences will occur and which justifies a decision in the applicant's favour. If uncertainty persists, the precautionary principle will itself perform a weighting function and one which favours maintenance of the status quo."

Considering that, according to the NCC, land clearing is identified as the single greatest threat to terrestrial biodiversity in NSW, the development of an offsets scheme which uses clearing as a 'driver' is irresponsible. Implementing such a scheme would result in an unacceptable risk that would exacerbate the existing problem.

The NCC is also concerned that too much focus is on facilitating clearing, rather than developing alternative schemes that would provide positive incentives.

5. Will the offsets scheme result in 'No Net Loss'?

The NCC takes examples from the US Wetland Banking experience to demonstrate that offset schemes can result in equal or increased area of wetlands, but it was doubtful that they represented a gain in wetland functions.

In addition, the NCC states that an offsets system, which is designed essentially to facilitate clearing, cannot provide the right incentive to achieve the NSW Government's 'No Net Loss' commitment. As the driving force in an offsets scheme is development, and not restoration or conservation, there will always be a motive by a developer to maximise a clearing potential while minimising any offset obligation.

6. Does the offsets scheme increase biodiversity values?

All scientific evidence, according to NCC, points to the fact that humans have not been able to create or recreate a complex ecosystem. In addition, there is not the economic or technological resources to create medium or high-quality vegetation across large areas (Simberloff, 1993).

While the main threats to genetic diversity are known, there is only speculation on the magnitude of the decline, as there is currently no broad-scale monitoring of changes to genetic diversity in NSW (Nature Conservation Council of NSW, 2001). Any offset scheme would also be limited by the deficiency of ongoing compliance and monitoring by DLWC.

7. Does the offset scheme promote sustainable agriculture?

The NCC believes that instead of trying to develop an offsets scheme, resources should instead be directed towards promoting sustainable agricultural schemes. The issue at stake should not be to make clearing more flexible, but to find those environmental attributes that are most relevant to the ecologically sustainable management of agricultural land.

8. Can offsets work in the present monitoring and compliance regime of the Department of Land and Water Conservation (DLWC)?

NCC is concerned that, in attempting to develop a policy on offsets, DLWC is acting in a confusing and contradictory role as 'farmers' friend'; as a compliance agent with regard to the development consent and assessment processes, and as the principal NSW Government agency responsible for the management of the State's natural resources.

The lack of any successful prosecutions of clearing breaches (over 620 reported breaches since the introduction of the NVC Act) indicates either a lack of commitment by DLWC to effectively administer the Act exists, or that political interference influences the enforcement obligations of the Department.

DLWC's role in an offset scheme would mean that it would be primarily be facilitating further development (clearing) rather than concentrating on addressing land degradation. An example of this conflict is evident in the competing roles of DLWC in native vegetation conservation (as under the NVC Act) and in facilitating plantation development (under the Plantations and Reforestation Act).

9. Does the offsets scheme promote fundamental changes in behaviour and resource use?

The NCC argues that the use of offsets does not promote changes at farm level or across regions in regard to long-term sustainable production or protection of biodiversity values.

In addition, the NCC supports the use of economic and market based instruments if their primary purpose is to improve and promote protection and management of native vegetation and biodiversity.

However, the NCC also argues there needs to be a distinction between market trading systems and an offset system. Although both rely on the trading of a biodiversity unit, the market trading system has as its focus improvement in land and water resources, while the offset scheme focus on offsetting negative impacts – which suggests continued reliance on traditional agricultural systems.

3.2.2 South Australian Native Vegetation Offset Scheme

The *Native Vegetation Act,* 1991 (SA), ("The Act") states that the Native Vegetation Council (NVC), established through the Act to consider clearing applications, may impose conditions when consenting to native vegetation clearance. These revegetation

conditions are generally referred to by the NVC as ‘set-aside conditions’ in the report entitled *Scattered Tree Clearance Assessment in South Australia* (Cutten and Hodder, 2002).

The relevant section of the Act is Section 29 (10), which states the following:
“*A consent under this Division is subject to conditions (if any) as the Council sees fit to impose, and any such conditions are binding on, and enforceable against, the person by whom the clearance is undertaken, all subsequent owners of the land and any other person who acquires the benefit of the consent*”.

It should be noted here that the Act deals with clearance of vegetation as well as scattered trees. Most of this overview of the South Australian framework for offsets deals primarily with scattered trees. This is because South Australia prohibits almost all clearing of native vegetation, except for public infrastructure works. Indeed, if native vegetation is allowed to be cleared, than a set-aside formula of 10 hectares for every 1 hectare cleared is applied (Hodder, M.W. 2003, pers. comm., 15 June). This 10:1 ratio is applied to revegetation, regeneration and securing land.

The NVC may also grant consent and impose conditions related to the clearance of high value native vegetation that fits the Act’s definition of an ‘isolated plant’. The relevant wording in the Act (Section 29(11)) is as follows:
“The Council may give its consent to clearance of native vegetation pursuant to subsection (4) if, and only if :

(a) it attaches to the consent a condition requiring the applicant to establish native vegetation on land specified by the Council; and

(b) the Council is satisfied that the environmental benefits that will be provided by that vegetation significantly outweigh the environmental benefits provided by the vegetation to be cleared".

In addition to the requirements under the Act, the NVC has adopted the following policy (Cutten and Hodder, 2002). A principal objective of the Native Vegetation Council is the conservation of the native vegetation of the State in order to prevent further reduction of biological diversity and further degradation of the land and its soil. In accordance with this objective, the Council has determined that, as a matter of general policy, any consent given to the clearance of native vegetation will be accompanied by conditions requiring action to significantly offset the effects of that clearance.

The conditions may include one or more of the following (listed in order of priority):

1. fencing and protection, on a permanent basis, of (an) existing stand(s) of native vegetation on the property, where appropriate also subject to a Heritage Agreement
2. fencing and protection, on a permanent basis, of an area containing degraded native vegetation, to be of the vegetation receiving clearance consent. The conditions will also reflect the time needed before the replacement vegetation will achieve the same level of environmental benefit as the vegetation approved for clearance.

3. setting aside, on a permanent basis, an area for revegetation using indigenous species propagated from local seedstock.

The purpose of set-aside areas is the achievement of a net environmental gain, by effectively replacing and improving the habitat lost through clearance (Cutten and Hodder, 2002). There is no ‘set of rules’ that can be established to ensure success for set-aside areas. However, set-aside guidelines have been established for proponents and government agencies to consider biodiversity benefits to the property and surrounding areas, site limitations and property management issues. The guidelines include (Cutten and Hodder, 2002):

1. Definition of scattered trees.
2. Adherence to Native Vegetation Clearance Principles regarding plant diversity, threatened plant species and associations, wetland environment, amenity and land management issues.
3. Wildlife habitat

A Point Scoring System (PSS) is applied to clearing assessments of scattered trees to establish the set-aside formula (Cutten and Hodder, 2002). This PSS considers different elements of the assessed tree, including height, health, hollows and proximity to other vegetation and wetlands. It also accords different weightings to each element to establish the set-aside formula. The set-aside formula is than multiplied by a factor of two or four, depending if it is degraded native vegetation being fenced, or placing intact native

vegetation under a heritage agreement. Intact native vegetation, as mentioned earlier, attracts a ratio of ten times the area cleared.

Industry concerns with clearance assessment in South Australia, and in particular towards the clearing assessment of scattered trees, include the following (Cutten and Hodder, 2002):

- Environmental record of the landholder should be taken into account. Clearance applicants should be given environmental credits for past conservation works on the property. Additionally, such credits count towards reducing the area to be set-aside and increase the prospects for clearance consent. In response, the NVC does consider reducing set-asides in some cases for previous environmental work.
- Existing native vegetation on property and in the vicinity should be taken into account such that prospects for clearance consent increase with increasing native vegetation on the property or in the vicinity. In response, the NVC stated that vegetation under application is attributed lower values the higher the level of native vegetation in the district.
- Proposed land-use should be taken into account. Industry sources argued that 'environmentally friendly' industries like forestry, which can lower water tables and provide carbon sinks, should be viewed more favourably in regard to clearance applications. At the time of writing, the NVC is still considering this.
- Should be able to trade off large set aside for clearance of high value trees. This approach entails trading biodiversity benefits property-wide, so that high value trees could be given sufficient offsets (replanting, fencing, heritage agreements)

elsewhere on the property. In response, the NVC stated that under the Act, if clearance is considered to be seriously at variance with any of the principles of clearing, clearing consent should not be granted. In this case, clearing one tree in return for keeping another provides no environmental benefit, only loss of trees from the system.

3.2.3 Victorian Native Vegetation Offset Scheme

In 2002 the Victoria Government released the report *'Victoria's Native Vegetation Management: A Framework for Action'*, to address vegetation management issues and native vegetation offsets (Department of Natural Resources and Management, 2002).

The Framework establishes a strategic direction for the protection, enhancement and revegetation of native vegetation across Victoria. It identifies the following as its major principles to guide native vegetation management in Victoria (Department of Natural Resources and Management, 2002):

- "*Retention and management of remnant native vegetation is the primary way to conserve the natural biodiversity across the landscape.*
- *The conservation of native vegetation and habitat in a landscape is dependent on the maintenance of catchment processes.*
- *The cost of vegetation management should be equitably shared according to the benefits accrued by the landholder, community and region.*

- *A landscape approach to planning native vegetation management is required. Goals for native vegetation management will be based on bioregions, or sub-units, within the Catchment Management Authority region. Priorities for vegetation management should be specific for each bioregion and catchment*".

The primary goal identified for native vegetation management is 'A reversal, across the entire landscape, of the long term decline in the quality and extent of native vegetation, leading to a net gain.

Gains may be either required offsets for permitted clearing actions or as a result of landholder and government assisted efforts that are not associated with clearing (Department of Natural Resources and Management, 2002).

The Framework states that the priority is to avoid clearing, but where clearing is permitted, offset criteria has been established to provide a clear link between gains and losses and in this way ensure that the commensurate of mitigation is met (Department of Natural Resources and Management, 2002).

The Framework places offsets alongside assisted restoration, as a major mechanism to enable the goal of a net gain of native vegetation. The notion of net gain recognizes that for native vegetation, although natural is best, it is possible to partially recover both extent and quality by active intervention and thus to affect the net result.

To measure progress towards a goal of 'net gain', the Framework introduces an accounting system using the concept of 'habitat hectares' (Department of Natural Resources and Management, 2002).

The habitat hectares approach is a site-based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type.

The Framework defines the concept of a habitat hectare as the following (Department of Natural Resources and Management, 2002):

"*If it is assumed that an unaltered area of natural habitat (given that it is large enough and is within a natural landscape context) is at 100% of its natural quality, than one hectare of such habitat will be equivalent to one habitat hectare. That is the quality multiplied by the quantity. Ten hectares of this high quality habitat would be equivalent to ten habitat hectares and so on. If an area of habitat had lost 50% of its quality (say through weed invasion and loss of understorey), than one hectare would be equivalent to 0.5 habitat hectares, ten hectares would be equivalent to five habitat hectares and so on*".

To ensure the use of a habitat hectares does not allow inappropriate trade-offs between high and low quality vegetation, quality thresholds have been set for offsets, graded according to conservation significance. This means that loss of high significance vegetation must be mitigated by improvement of comparable vegetation. Revegetation as the only means of offset will generally only be an option for mitigating lower quality or lower significance losses (Department of Natural Resources and Management, 2002)**.**

On a site where the loss of vegetation is temporary (eg. mining followed by rehabilitation) this criterion is applied according to Low Conservation Significance. However, to meet the appropriate net outcome of offset in the number of hectares replaced, this quality criteria will be applied according to the conservation significance of the vegetation that was removed (Department of Natural Resources and Management,

2002). For example, in relation to Very High Significance Vegetation, the net outcome should be substantial net gain, which is at least two times the loss in habitat hectares.

The Framework also recognizes that there be an adequate geographic link between losses and offsets. If the loss is a higher significance vegetation, than the offset should be as close to as possible the original vegetation area. If the loss is in a lower significance vegetation community, then more flexibility is available to optimize outcomes (Department of Natural Resources and Management, 2002).

To ensure delays between clearing and mitigation do not exacerbate the risk to environmental values, the timing of offsets needs to be appropriate. There will be a graded response: from formally initiating offsets prior to clearing taking place, to initiating offsets as soon as seasonally practicable after clearing has taken place (Department of Natural Resources and Management, 2002).

Environment Victoria (EV), Victoria's peak statewide environment group, has responded in detail to the *Native Vegetation Management: A Framework for Action* document (Waterman and Booth, 2000).

The Net Gain Trade-off Approach

EV views the Net Gain trade–off approach as the fundamental driver of the Framework. EV disagrees with Net Gain trade-off and advocates a native vegetation protection and management system in Victoria based on 'Gain' rather than 'Net Gain', where all existing remnants are protected from decline and become the basis of landscape renewal and biodiversity restoration (Waterman and Booth, 2000).

Principles

The Principles contained within the Framework relating to the value and importance of protecting existing remnant vegetation, according to EV, are worthy of commendation. However, EV states there are clear inconsistencies between these principles and the actions proposed in the Framework, especially in regard to the threat of conservation of remnant vegetation from continued land clearing and compensatory trade-offs under the proposed Net Gain trade-off approach.

Net Gain trade-offs allow land clearing to continue

EV is critical of the fact that through the habitat hectare formula, substantial areas of low conservation value vegetation on private land will be open to further clearing. EV states that Victoria's fragmented system of remnants on private land is at an ecological crisis point or beyond. Vegetation remnants, even those that are depleted and disturbed, contain genetic material that constitutes the building blocks for landscape renewal and biodiversity restoration (Waterman and Booth, 2000).

Offsets

The Framework, according to EV, implies that the use of offsets is needed because trade-offs are occurring in a haphazard and uncontrolled way. However this is insufficient reason to legitimize through Government policy, environmentally harmful actions. The alternative way to proceed in Victoria, according to EV, is to reject trade-offs and stop land clearing because of the following reasons (Waterman and Booth, 2000);

- The judgement about benefit against loss is very subjective. Often, the alleged benefit will not outweigh the loss of the vegetation.

- Restoration offsets, relative to protection of vegetation, is often less cost effective, and the time scale of restoration efforts to replace conservation values is extremely long and will never achieve a result fully equivalent to the original vegetation.

- Administration of a policy of offsets is likely to be a ‘nightmare’. Judgements, even with the tightest policy prescriptions, are subjective and therefore extremely variable. Enforcement, management and consistency are usually foreign concepts where such a policy is introduced.

- If offsets are to be sanctioned, they should be considered independently to the question of whether clearing applications should or should not be approved. Offsets should only be considered as an absolute last resort.

3.2.4 3.2.4 Conclusions from Native Vegetation Offset Programs

The above examples of native vegetation offset programs illustrate a number of key issues in relation to offsets. The following summarizes potential advantages and disadvantages regarding the proposed offset programs from stakeholders in land management. These conclusions could be integrated into a Western Australian offset policy framework to ensure stakeholders concerns are addressed.

Advantages

- Increased regional development opportunities

- Potential to diversify farm incomes by earning credits for vegetation management
- More effective and cost-effective remediation measures (by allowing offsets to occur at the site of greatest environmental benefit, least risk, least cost.
- Offsets can achieve environmental improvements at lower cost than regulation, and allow resources to be used where they can achieve the greatest environmental improvement.
- Offsets can establish quality thresholds to limit inappropriate trade-offs (Habitat hectares).
- Timing of offsets can be achievable, through a graded response of initiating offsets prior to development or as soon as seasonably practicable.
- Offsets can achieve environmental benefits from infrastructure projects (railways, powerlines, roads) which are rarely refused on the grounds of economic and social development.

Disadvantages

- Lack of accurate and sufficient data on native vegetation
- Offsets cannot recover the cost of damage to existing biodiversity, because the cost of replacement is higher
- Scientific uncertainty regarding potential of humans to replace complex ecosystems

- Lack of effective compliance and monitoring schemes by government agencies will jeopardize on-going success of offset projects.
- Landholders get no recompense for delivery of public good conservation. Offsets should not demand additional contributions from landholders.
- Nature cannot be predicted, therefore the principle of ‘no permanent environmental costs’ is overly restrictive.
- Offsets provide increased flexibility for clearing, rather than avoidance.

3.3 Restoration Ecology Literature Review

This part of the literature review will seek to investigate and form an overview of the restorative abilities of Western Australian vegetation. For the purposes of this paper, it is not the intention to look at specific vegetation types and their restorative characteristics,

but rather to determine whether or not restoration is a realistic ecological option in relation to offsets.

This knowledge is important because a proposed offset policy/framework could incorporate restoration of cleared or disturbed land in Western Australia.

3.3.1 Western Australian Native Vegetation

Western Australia represents almost a third of the Australian continent and spans from the Great Australian Bight to the tropical coasts of the Timor Sea. Vegetation consists of eucalypt tall open forests, acacia woodlands, chenopod shrublands, hummock grasslands and mallee communities of the arid interior, with acacia shrublands and tussock grasslands in the north (National Land and Water Resources Audit, 2001). A total of 833 vegetation associations are recognized in Western Australia ((Beeston *et al.*, 2002)

3.3.2 Present Native Vegetation Extent

A recent mapping exercise using National Vegetation Information Standards (NVIS) (National Land and Water Resource Audit, 2000) has verified the current vegetation extent in Western Australia (Beeston *et al.*, 2002). For the purposes of this NVIS project, Western Australia was divided into two zones. The Intensive Land-Use Zone (ILZ) describes the south-west agricultural area, dominated by intensive agricultural practices, including cropping, livestock, horticulture, intensive livestock production and resource protection. The other zone is the Extensive Land-Use Zone (ELZ) which describes the

remainder of the State, where land use is dominated by grazing and mining activities (see figure 3.2 overleaf).

Figure 3.2. Land-use zones in WesternAustralia

(Beeston *et al.*, 2002)

Clearing of native vegetation is very pronounced in the ILZ, where only approximately 30% of native vegetation remains. More than 20% of this remaining native vegetation is

in land managed by the Department of Conservation and Land Management (DCLM). In the ELZ, the vegetation remains largely intact, however the structure and floristics have been substantially altered since European settlement by grazing and by altered fire regimes (Beeston *et al.*, 2002).

The EPA, in considering the environmental protection of native vegetation in WA, has stated that, "*from a biodiversity perspective, the threshold level below which species loss appears to accelerate exponentially at an ecosystem level is regarded at being at a level of 30% of the pre-clearing extent of the vegetation type. A level of 10% of the original extent is regarded as being a level representing endangered"*(Environmental Protection Authority, 2000).

A total of 119 (of the 833) vegetation associations in Western Australia have been reduced to below 30% of their pre-European extent, and of these, 48 have less than 10% remaining and two associations are probably extinct (Beeston *et al.*, 2002).

3.3.3 Restoration Ecology

Restoration ecology covers a wide range of activities involved with the repair of damaged or degraded ecosystems. An array of terms have been used to describe these activities, including restoration, reclamation, rehabilitation, reconstruction and reallocation. Many of these terms are used interchangeably or differently (Hobbs, 1999).

Hobbs and Norton (1996) state that a stable terminology would be useful, but rather than descend into a nomenclature quagmire, it is more instructive to emphasize that restoration occurs along a continuum and that different activities are simply different forms of restoration. To this end, this paper will use the term ‘restoration’ to cover restoration, reclamation, rehabilitation, reconstruction, reallocation and revegetation.

As previously mentioned, ecological restoration can occur along a continuum from the rebuilding of totally devastated sites, to the management of relatively unmodified sites (Hobbs and Norton, 1996). Restoration ecology has at its core the assumption that many degrading forces are temporary, and that a proportion of habitat loss and population decline is recoverable (Young, 2000).

Restoration is usually carried out for one of the following reasons (Hobbs and Norton, 1996).

- To restore highly degraded but localized sites like mine sites.
- To improve the productive capability in degraded production lands, restoration in these cases aims to return the system to a sustainable level for productivity, for example by reversing or ameliorating soil erosion or salinization problems in agricultural lands.
- To enhance conservation values in protected landscapes. The various forms of degradation include the effects of stock, invasive species (plant, animal or pathogen), pollution and fragmentation. Restoration in these cases aims to reverse the impacts of these degrading forces.

- To enhance conservation values in productive landscapes. In addition to the need for restoration within conservation areas, there is also the need to increase the extent of native vegetation in areas where habitat loss and fragmentation are widespread. Restoration in this case involves returning conservation values to portions of the productive landscape, in recognition that protected areas alone will not conserve biodiversity in the long term.

The basic components of an effective restoration project include: clear objectives (ecological and physical), baseline data and historical information (e.g. the hydrogeomorphic setting and the disturbance regime), a project design that recognizes functional attributes of biotic refugia, a comparison of plans and outcomes with reference ecosystems; a commitment to long-term planning, implementation and monitoring and, finally, a willingness to learn from both successes and failures (Wissmar and Beschta, 1998). Within these broader aims and objectives, more specific goals are required to guide the restoration process for a particular site, including (Hobbs and Norton, 1996).

1. 1. Composition: presence of species and their abundance;
2. 2. Structure: vertical arrangement of vegetation and soil components (living and dead);
3. 3. Pattern: horizontal arrangement of system components;
4. 4. Heterogeneity: a complex variable made up of the first three components;

5. 5. Function: performance of ecological processes, including water, energy and nutrient transfers;
6. 6. Species interactions, including seed dispersal and pollination;
7. 7. Dynamics and resilience: succession and state transition processes, recovery from disturbance;

So what can be said, in broad terms, about the restorative capabilities of Western Australian native vegetation? In terms of this study, one useful method is to provide an overview of the challenges and limitations of restoration ecology.

Restoration can be a costly business, and the complexity of most ecosystems and their responses to environmental factors means restoration outcomes cannot be accurately predicted (Hobbs, 1999). Work by the Australian Association of Bush Regenerators (AABR) has confirmed costs of managing bushland in good condition as being in the order of $5000 per hectare (the main tasks in good condition areas are generally weed control, dieback control, fencing in some areas to control pedestrian access or stock, rubbish removal, track closure). For complete reconstruction of an area in very poor condition it is in the order of $70 000 per hectare (the reconstruction program involves weed control, seedling establishment at a rate of two plants per square metre which are watered in, direct seeding and amelioration of the physical and chemical characteristics of the substrate)(Kaesehagen, 2001).

To extrapolate these costs to agricultural or other types of development, restoration offsets may be prohibitive for some proponents.

There is also the question of scale. It is increasingly recognized that restoration or management of a particular ecological unit or area must frequently be accompanied by landscape level management both to accommodate the habitat and movement needs of fauna, and also to deal with rising watertables and salinization, weed invasion and feral predators (Hobbs and Yates, 1999).

In Western Australia, another factor that can influence restoration is the presence or absence of moisture. Beard (1990) argues that the supply of moisture is of overriding importance for vegetation, and that the critical factor will be the season and length of the dry period. Additionally, restoration is dependent on the interaction of many other factors, including grazing, fire, competition from weeds and difficulties in propagating many native species {Hobbs and Norton, 1996 #42}.

3.3.4 Can Restoration Provide A Realistic Offset Option?

The previous section has demonstrated that restoration of native vegetation is a complex and challenging task. Issues including incomplete understanding vegetation complexity, unpredictable rainfall, landscape threats and cost of restoration provide the land manager and the potential use of ecological restoration as an offset mechanism with many challenges.

It is within current capabilities to restore vegetation structure and function to a lesser degree and assist the conservation of biodiversity and land degradation problems, including salinization, wind and water erosion and water-logging (Hobbs, 1993).

Restoration can increase the extent of native vegetation and increase connections between isolated remnants (Hobbs, 1993). Creation of buffer strips around existing native vegetation remnants, provision of corridors between isolated remnants, increasing habitat for some species and stabilizing the agricultural landscape will assist in preventing the loss of further remnants in the agricultural areas of Western Australia (Hobbs, 1993).

Landscape-scale restoration is still largely in its infancy, but the recognition of the importance of embarking on restoration at a landscape or regional scales is increasing, and examples of landscape scale projects are beginning to accumulate (Hobbs, 2002). One example is the '*Dongolocking Pilot Planning Project for Remnant Vegetation'* (Wallace, 1998), which has established the explicit goal to manage the remnant native vegetation and surrounding lands so that populations of the existing native biota are viable in the medium term (fifty years).

The goals of restoration will dictate the approach to be taken (Hobbs, 1993). If the aim is to preserve and restore the original biota, or combat land degradation processes, than clearly articulated goals and objectives (with measurable and auditable targets) need to be established. These goals and objectives also have to be based in political and economic

realities. Indeed, the chief limitations of widespread restoration efforts are not biological, but political and economic (Saunders, 1993).

It is therefore possible to use restoration as an offset option depending on the ecological scale and complexity of the restoration project. Offsets could utilize restoration in a number of ways, dependent on the objectives of particular offsets. Restoration can:

- Increase buffers for existing remnants which may be under threat
- Provide linkages between remnants
- Combat land degradation problems
- Contribute to landscape-scale restoration projects

3.4 Environmental Impact Assessment (EIA) Literature Review

In regard to native vegetation offsets, as well as broader environmental offsets, it is important to gain an understanding of when offsets are being considered in the environmental impact assessment (EIA) process. It is also equally important to examine the decision- making framework of the EIA process to ensure consideration of offsets is transparent and accountable. To this end, the following part of this literature review examines the EIA process in Western Australia.

3.4.1 Background

Part IV of the *Environmental Protection Act, 1986* (WA), (the Act) establishes provisions for the Environmental Protection Authority (EPA) to carry out environmental impact assessment (EIA) in Western Australia (Environmental Protection Authority, 2002a).

Division 1 of Part IV of the Act enables the EPA to carry out EIA of development proposals that it considers are likely to have a significant effect on the environment (Environmental Protection Authority, 2002a). Govt gazette

The EPA's objectives for EIA are(Environmental Protection Authority, 2002a):

- *"To ensure that proponents take primary responsibility for protection of the environment influenced by their proposals;*

- *To ensure that best practicable measures are taken to minimise adverse impacts on the environment, and that proposals meet relevant environmental objectives and standards to protect the environment, and implement the principles of sustainability;*
- *To provide opportunities for local community and public participation, as appropriate, during the assessment of proposals;*
- *To encourage proponents to implement continuous improvement in environmental performance and the application of best practice environmental management in implementing their proposal; and*
- *To ensure that independent, reliable advice is provided to the Government before decisions are made"*.

Section 40 (1) of the Act provides for the EPA to decide whether or not to assess a proposal. The EPA's decision is based upon information within the proposal and any additional information it has obtained from the proponent, government agencies or interest groups (Environmental Protection Authority, 2002a).

Five levels of assessment are available to the EPA. They are briefly outlined below (Environmental Protection Authority, 2002a):

- *"Assessment on Referral Information (ARI);*
- *Proposal Unlikely to be Environmentally Acceptable (PUEA);*
- *Environmental Protection Statement (EPS);*
- *Public Environmental Review (PER); and*

- *Environmental Review and Management Programme (ERMP)”*.

The Assessment on Referral Information (ARI) level is typically applied to proposals which raise one or a small number of significant environmental factors that can be readily managed (Environmental Protection Authority, 2002a).

The Proposal Unlikely to be Environmentally Acceptable (PUEA) level of assessment will apply to proposals that are clearly in contravention of established or applicable environmental policy, standards or procedures, could not be reasonably modified to meet EPA’s environmental objectives, or are proposed in a special environmental area (Environmental Protection Authority, 2002a).

The Environmental Protection Statement (EPS) level of assessment will be typically applied to proposals of local interest that raise a number of significant environmental factors which can be readily managed, and where in the judgement of the EPA, a formal public review period may be unnecessary because the proponent has adequately consulted with stakeholders (Environmental Protection Authority, 2002a).

The Public Environmental Review (PER) level of assessment will typically be applied to proposals of local and regional significance that raise a number of significant environmerntal factors, some of which are considered complex and require detailed assessment to determine whether, and if so how, they can be managed. The proponent is required to release a PER document for public consideration after the EPA is satisfied all environmental factors have been included (Environmental Protection Authority, 2002a).

The Environmental Review and Management Programme (ERMP) level of assessment will be applied to proposals of state interest that raise a number of significant environmental issues, many of which are considered to be complex or of a strategic nature, and require substantial assessment to determine whether, and if so how, they can be managed in an acceptable manner. The EPA considers that such proposals should be subject to extensive public review (Environmental Protection Authority, 2002a).

Once the level of assessment is determined, a Geographic Information System (GIS) within the Department of Environment is used to establish the key environmental factors to be addressed by the proponent. This links environmental factors with environmental objectives established by the EPA .

The environmental objectives are determined from a variety of sources including (Morrison-Saunders and Bailey 2000):

- The prescriptive requirements of existing legislation (for instance, the *Wildlife Conservation Act 1950*, WA)
- Existing guidelines (for instance, *National Strategy for the Conservation of Australia's Biological Diversity*)
- Standards (for instance, pollution emission levels) set through national or state councils
- Environmental Protection Policies previously established by the EPA under the *Environmental Protection Act, 1986 (WA)*;

- A series of EIA policies in the form of “guidance documents for the assessment of environmental factors” prepared by the EPA in recent years;
- Recommendations of the EPA for projects that have previously undergone EIA in Western Australia.
- Position Statements (for instance, *Position statement No. 2, Environmental Protection of Native Vegetation In Western Australia – Clearing of Native Vegetation, With Particular reference to The Agricultural Area)*

When evaluating the proponents EIA document, the EPA uses the objectives established for the relevant environmental factors as a basis for assessment to the Minister (Morrison-Saunders and Bailey, 2000).

From this point in the EIA process, the EPA requires the proponent to provide detailed information on each of the identified factors to enable the EPA to be confident the impact will not compromise EPA objectives (Bowen 1997). If the EPA is not satisfied with the proponents commitments, the EPA may make recommendations for additional environmental management action to be taken to meet the environmental objectives (Morrison-Saunders and Bailey, 2000).

The Western Australian EIA process links with EPA objectives for EIA and places emphasis on environmental management programs after the project has been approved (Bailey, 1997). The outcome of the EIA is generally an approval to proceed subject to a range of environmental design and management objectives (Bailey, 1997).

3.4.2 Western Australia's EIA Process and Offsets

In regard to Western Australia's EIA process and offsets, a number of positive and negative issues come to light. On the positive side, Western Australia's EIA process is seen as very transparent, with considerable opportunities for public participation and information sharing (Morrison-Saunders and Bailey, 2000). This bodes well for consideration of offsets within the EIA process, because it is relatively straightforward for the public to determine the extent to which environmental factors are accounted for by decision makers and the extent by which projects are modified during the decision making process (Morrison-Saunders and Bailey, 2000).

Another strength of the Western Australian EIA process is that by establishing objectives for environmental factors, the EPA is framing each proposal in a regional context. EIA in general has been frequently criticized in the past for its relatively narrow spatial and temporal scope (Lenzen *et al.*, 2003). Lakshmanan and Johansson (1985) point out, while *"projects may be localised spatially, their consequences are incident on various activities at many spatial levels (local, regional, national, and international), and have diverse environmental, economic, social, and institutional effects"*. Similarly, Shepherd and Ortolano (1996) stress that "*EIA at the project level is insufficient* ... [because it] *starts too late, ends too soon, and is too site-specific"*. The environment suffers the effect of "death by a thousand cuts"(Jenkins, Dr. B. 2003, pers. comm., 30 July).

Additionally, Morrison-Saunders and Bailey (2000) state that a potential weakness in EIA in Western Australia is that it risks being reductionist. By reducing each proposal

down to discrete parts and assigning environmental objectives to them, it may not represent overall environmental functions and ecosystem maintenance. It is possible for each environmental factor to meet the minimum requirements of the EPA objectives, but the cumulative effects of all of the proposals impacts acting together may have undesirable environmental consequences. More recently, though, the EPA has begun to include 'biodiversity' as a factor in the scoping guidelines (Morrison-Saunders and Bailey, 2000). This factor is now included for most proposals where the cumulative ecosystem impact must be considered. However, a recent study conducted regarding the consideration of biodiversity in EIA in Western Australia, found that the lack of data on flora and fauna, and an associated database, was considered a barrier to consideration of biodiversity (Wegner, 2001).

In some recent examples of offsets in Western Australia (see chapter 4), offsets are considered in the beginning of the EIA process through negotiations between agency staff and proponents (Atkins, K. 2003, pers. comm., June 16; Morrell, J., 2003, pers. comm., 19 June; Jenkins, B. 2003, pers. comm., 30 July).

There is currently no peer-reviewed literature regarding when offsets should be considered within EIA, but previously mentioned details within the NSW and Victorian frameworks, and comments from Environment Victoria and the ACF, state that offsets should only be considered after the EIA process has made its decision to proceed.

Chapter 4 Legislative And Policy Framework And Recent Offsets In Western Australia

4.0 Introduction

This chapter outlines firstly, the current legislative and policy structure in Western Australia, and secondly, provides recent examples of Western Australian offsets.

Western Australia is a signatory to a number of agreements incorporating aspects of a no net loss policy, as well as other state based legislative and policy initiatives that contribute to native vegetation management and protection. The current legislative and policy structure provides the framework for the development of a native vegetation offset policy. Each of the specific agreements, legislation and policies relevant to native vegetation policy will be briefly reviewed below.

4.1 Agreements

4.1.1 National Objectives and Targets for Biodiversity Conservation 2001 – 2005

The National Objectives and Targets for Biodiversity Conservation 2001 – 2005 (Environment Australia, 2001) was signed by Western Australia's Minister for the Environment in June 2001. The key commitments include:

"*Objective 1.1: Reverse the long-term decline in the quality and the extent of Australia's native vegetation and ecological communities and the ecosystem services they provide.*

Target 1.1.2: By 2003, all jurisdictions have clearing controls in place that prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750.

Target 1.1.4: By 2001 all jurisdictions have clearing controls in place that well have the effect of reducing the national net rate of land clearance to zero".

4.1.2 The Partnership Agreement for the Bushcare program under the original Natural Heritage Trust.

This agreement has as its national goal to reverse the long-term decline in the quality and extent of Australia's native vegetation cover through joint funding for Bushcare, Coastcare and other programs from the Commonwealth and Western Australia (Environment Australia, 2003). The Natural Heritage Trust 2 (NHT 2) is currently being negotiated and developed, and is devolving responsibilities and funding to regional level groups to achieve the above national goal of reversing the long-term decline in the quality and extent of Australia's native vegetation (Environment Australia, 2003).

4.1.3 The National Framework for the Management and Monitoring of Australia's Native Vegetation

*The National Framework for the Management and Monitoring of Australia'*s *Native Vegetation* (ANZECC, 2000) is an agreement intended to provide a unified, multilateral forum through which to pursue improvements to native vegetation management and monitoring. It describes best practice principles for land clearing legislation that protects native vegetation of high conservation or cultural value. This includes providing (ANZECC, 2000):

- "*Duty of care concept for all land managers in relation to sustainable management of native vegetation.*

- *Consistent application across all land tenures and vegetation types.*
- *An integrated bioregional approach.*
- *A range of implementation mechanisms; and*
- *A clear and transparent decision-making process that is legally defensible".*

It also provides best practice principles for establishing and managing a formal conservation reserve system, including integrating this management with other conservation programs and land management programs operating outside the total reserve system.

4.1.4 The Intergovernmental Agreement on the National Action Plan for Salinity and Water Quality

In June 2002, WA signed the *Intergovernmental Agreement for the National Action Plan on Salinity and Water Quality* (Waters and Rivers Commission, 2002). Recognizing the fact that land clearing in salinity risk areas is a primary cause of dryland salinity, effective controls on land clearing are required in each jurisdiction before any Commonwealth funds are committed to WA to address salinity issues.

4.2 Legislation

4.2.1 The Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

Under the *Environmental Protection and Biodiversity Conservation Act* 1999, approval from Environment Australia may be required for native vegetation clearing that will have

a significant impact on a matter of national environmental significance. These include (Environment Australia, 2003):

- World Heritage properties
- Ramsar wetlands of international significance
- • Nationally listed threatened species and ecological communities
- Listed migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining)

4.2.2 Environmental Protection Act 1986 (WA)

The Environmental Protection Act, 1986 (WA) does not currently contain specific provisions for vegetation clearing, however proposed amendments (see below) seek to introduce the concept of "environmental harm" and significant vegetation clearing controls.

4.2.3 Western Australian Environmental Protection Amendment Bill 2002

On June 26 2002, the Environmental Protection Amendment Bill 2002 ("the Bill") was introduced to state parliament. The Bill is expected to come into effect in late 2003. It introduces a permit system for clearing and has broadened assessment principles to include consideration of plant diversity, fauna habitat, rare flora, threatened ecological communities, waterways and groundwater, land degradation and salinity.

The Bill significantly increases penalties for unauthorized clearing from a current maximum of $2000 under the Soil and Land Conservation Act up to a maximum $250 000 fine. The net effect of the new Bill should be to drastically limit legal and illegal clearing, and therefore contribute to no net loss of native vegetation.

In Section 51H of the Bill, the Chief Executive Officer (CEO) of the Department of Environmental Protection may grant a clearing permit subject to any conditions which the CEO considers are necessary or convenient for controlling environmental harm or offsetting the loss of vegetation. For example, the CEO can impose a condition requiring the proponent to plant vegetation in other areas, enter into a conservation agreement or require a person to make a contribution to a fund for the purpose of establishing or maintaining vegetation. This could assist in the purchase of areas for the Conservation Estate (McIntosh, 2002).

4.3 Environmental Protection Policies

The following Environmental Protection Policies (EPP's) have been enacted under the *Environmental Protection Act 1986* and are incorporated into the EIA process as an environmental objective. When evaluating the proponents EIA document, the EPA uses the objectives established for the relevant environmental factors as a basis for assessment to the Minister (Morrison-Saunders and Bailey, 2000).

4.3.1 Environment Protection Policy (Swan and Canning Rivers) 1998

The *Environmental Protection Policy (Swan and Canning Rivers) 1998* (Environmental Protection Authority, 1998a) provides for the protection of 'beneficial uses' of the Swan

and Canning Rivers, including the maintenance of ecological processes. The Swan-Canning EPP will be implemented through a Comprehensive Management Plan (CMP) to address the needs of protected waterways and watercourses in the Region. This EPP binds Government to deliver against its objectives.

4.3.2 Environmental Protection Policy (South West Agricultural Zone Wetlands) 1998

The purpose of the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998* (Environmental Protection Authority, 1998b) is to prevent the further degradation of valuable wetlands and to promote the rehabilitation of wetlands in the South West Agricultural Zone of the State.

4.3.3 Environmental Protection Policy (Peel Inlet-Harvey Estuary) 1992

The purpose of the

Environmental Protection (Peel Inlet-Harvey Estuary) Policy 1992(Environmental Protection Authority, 1992a) is to set out environmental quality objectives for the Estuary and to outline the means by which the environmental quality objectives for the Estuary are to be achieved and maintained.

4.3.4 Environmental Protection (Swan Coastal Plain Lakes) Policy 1992

The purpose of the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (Environmental Protection Authority, 1992b) is to protect the environmental values of lakes on the Swan Coastal Plain.

4.4 EPA Position Statement No 2

The Environmental Protection Authority's Position Statement No 2 Environmental Protection of Native Vegetation in Western Australia: Clearing Of Native Vegetation, With Particular Reference To The Agricultural Area (Environmental Protection Authority, 2000) provides a public statement of the EPA's position on clearing.

It indicates, "in some instances, the Environmental Protection Authority (EPA) could support clearing in agricultural areas if the impact is not significant and there was an overall benefit as a result of the proposal. This could include ensuring protection and management of higher quality remnant native vegetation in the general area (not necessarily on the same property)" (Environmental Protection Authority, 2000). Such an environmental benefit could presumably be achieved through a suitable offset provided by the proponent and implies like for like and like for better.

4.5 Wildlife Conservation Act 1952 (WA)

Under the Western Australian Wildlife Conservation Act, 1952, there are lists of endangered fauna and declared rare flora (DRF) species that are protected under legislation and approval is required from the State Environment Minister to "take" these species. "Take" in this context has a wide definition that includes a range of actions that may threaten the species. The names of species protected by the legislation and listed are available from DCLM for specific areas.

4.6 Soil and Land Conservation Act 1945 (WA)

The Soil and Land Conservation Act 1945 (WA) is currently the main legal mechanism for controlling activities causing land degradation, including vegetation removal. When an owner or occupier of land intends to clear more than one (1) hectare of their land, there is a requirement for notification to be made to the Soil and Land Conservation Commissioner at least 90 days prior to starting work.

The Notice of Intent to Clear Land form is required to be lodged for consideration by the Commissioner. The Commissioner can impose a soil conservation notice to prevent clearing where land degradation is likely to occur. The Environmental Protection Authority may assess a proposal to clear where it is of environmental significance, and if it does so the Minister for the environment must give approval before the clearing can proceed.

4.7 The Proposed Biodiversity Conservation Act for Western Australia

The Consultation Paper entitled 'A Biodiversity Conservation Act for Western Australia: Consultation Paper' (Government of Western Australia, 2002) for the proposed Biodiversity Conservation Act (this is a major revision of the current Wildlife Conservation Act, 1952 (WA), has proposed to include condition setting powers that would allow conservation offset conditions to be imposed in appropriate cases. Further to this, the Consultation Paper states that, "it may be appropriate to allow a certain activity to proceed that compromises the protection of specially protected flora, fauna or

ecological communities, provided an offset condition is imposed to ensure that any adverse impacts of that activity are more than offset by conservation outcomes elsewhere" (Government of Western Australia, 2002).

4.8 Conclusions

These agreements, policies and legislation at the Commonwealth and State level highlight the desirability for WA to develop an overarching state level policy and legislative framework to adequately address native vegetation loss and offsets.

For Western Australia to meet these targets and agreements, a native vegetation policy that incorporates offsets would assist in neutralizing the clearing equation and therefore contribute to the no net loss of native vegetation.

4.9 Recent Offsets in Western Australia

This section provides examples of recent offsets in Western Australia that demonstrate current environmental and native vegetation offset practice. Table 4.1 on page 88, summarizes eighteen recent examples in total. Sixteen of these offsets have been assessed formally through the EIA process, and two of the examples have been informally assessed through advice from the Department of Conservation and Land Management (DCLM).

4.10 Types of Offsets

All of the examples included either a donation of funds by proponents for acquisition of land to be added to the Formal Conservation Reserve System managed by DCLM, or

through donation of funds to protect and better manage similar types of the vegetation impacted upon. One example also included restoration of an already degraded area. Projects include offsetting impacts to wetlands, threatened ecological communities and other vegetation types. Another project (Busselton Wastewater Treatment Plant) committed funds to reduce diffuse nutrient loads entering Geographe Bay through advice from DCLM.

4.11 No Net Loss Outcomes and Recent Offsets in Western Australia

Seventeen of the eighteen examples resulted in a net loss of native vegetation. The offsets required were largely a like for like trade and more often than not replaced the impacted area through securing natural habitat for the conservation estate.

An example to illustrate this is the Lancelin to Cervantes Road (see table 4.1) (Environmental Protection Authority, 2002c). For this project, it was estimated by the EPA that approximately 220 hectares of vegetation would be cleared for the proposed road. The EPA recommended that funds be provided to purchase an equivalent area and also to relinquish road reserves no longer required, an additional 102 hectares. However, the area secured was not under any threat and possibly would not be given permission to be cleared. Therefore, all that is being gained is a marginal increase in protection, management and greater security of tenure. Therefore, approximately 220 hectares of native vegetation was lost. This offset result was typical across most examples.

The only example, from this sample of eighteen offsets in WA, to have an outcome of net gain of vegetation quantity and quality was the titanium mining proposal in Yarloop (Environmental Protection Authority, 1999b). The proponent's commitments included securing nine hectares of privately owned land for inclusion in the Conservation Estate, fencing of vegetation in adjacent reserves and restoring the native vegetation on the existing rubbish tip. The project resulted in a net gain of 0.8 hectares of native vegetation quality and quantity through restoration of an existing degraded area (if the restoration is successful - see table 4.1).

4.12 Tenure Of Land and the Implications For No Net Loss

The EPA has set conditions for securing privately owned native vegetation for inclusion into the Conservation Estate in response to a clearing application of the same or similar vegetation. However, this will lead to a net loss of vegetation. It will only contribute to a no net loss of vegetation quantity if it is highly likely the land is to be cleared before it is added to the conservation estate. It may lead to an increase in vegetation quality, but only if the future management practices are of a better standard than the previous management practices.

Further to this, the expected implications of the Environmental Protection Amendment Bill 2002 is that legal clearing will be more rigorously assessed and illegal clearing will be significantly reduced due to increased fines (Schedule 1 item 8D Environmental Protection Act 1986). Therefore, increasing the protection status of land may be less important.

4.13 Restoration and the Implications for No Net Loss

A number of conditions, under Section 45 of the Environmental Protection Act 1986, set by the EPA in relation to offsets in the examples in Table 4.1, relate to restoration and rehabilitation of native vegetation. Restoration of natural habitats takes a certain amount of time before it is partly or fully functioning in terms of ecological functions and processes are realized. In addition, restoration outcomes cannot be accurately predicted (Hobbs, 1999).

Therefore, restoration may contribute to no net loss in the long term if it succeeds, but cannot be measured as a no net loss of vegetation quality and quantity until it does succeed. The restoration formulaic proposals in NSW, Victoria and South Australia (see Chapter Three), which grades offsets according to the significance of the vegetation impacted upon and time lag factors, may assist in enabling restoration to contribute more significantly to no net loss.

4.14 EIA Process and Recent Examples of Offsets

Offsets are often considered at the beginning of the EIA process (Atkins, Dr. K. 2003, pers. comm., 16 June; Morrell, J. 2003, pers. comm., 30 June; Jenkins, Dr. B. 2003, pers. comm., 30 July) through negotiations between proponents and government agencies under section 51H of the Environmental Protection Act 1986 (WA). It would be fair to assume that the aims of government agencies is to facilitate best practice and strategic environmental outcomes, and for proponents, the aim is to gain development approval.

4.15 Conclusions for Current Offsets in Western Australia

It is apparent that the current offsets examples in Table 4.1 are not achieving no net loss objectives. If we can extrapolate from these examples to the use of offsets in WA generally, than it is doubtful that no net loss of native vegetation quality and quantity is being achieved through the current use of the offset mechanism.

The current offsets in Table 4.1 could be termed as ‘partial offsets’. These offset examples highlight the need for a consistent and strategic approach to offsets so the goals of no net loss can be achieved. To achieve no net loss of native vegetation quality and quantity, objectives, criteria and principles need to be developed to provide a consistent and strategic approach to native vegetation offsets.

Table 4.1: Examples of Recent Offsets

	TITLE	BULLETIN/ DATE	OFFSET TYPE	OFFSET RESULT
1	**Pilbara to goldfields gas pipeline**	Bulletin 760 Oct 1994 (Environmental Protection Authority, 1994)	Proponent to assist in funding a management plan for Wanjarri Nature Reserve and provide ecological replacement of land impacted by pipeline easement within Wanjarri Nature Reserve by rehabilitation of an equivalent area or by facilitating an addition of land to the reserve.	Net loss of vegetation
2	**Jandakot Groundwater Scheme Stage 2**	Bulletin 587 Sept 1991 (Environmental Protection Authority, 1991)	Acquiring land for creation or rehabilitation of similar wetland function and type expected to be impacted from development.	Net loss of vegetation However, the resultant rehabilitation was satisfactory to all concerned (Jennings, P. 2003, pers. comm., July 30)
3	**Tonkin Hwy Extension from Mills Road West Gosnells to South Western Highway Mundijong,**	Bulletin 1043, 2002 (Environmental Protection Authority, 2002c)	Details of wetlands to be acquired Specific areas/lots for wetlands enhancement and creation Vesting and long term management responsibility of wetlands outside the road reserve Rehabilitation or acquisition of other suitable sites to mitigate dryland Threatened Ecological Communities (eg Bush Forever site 345)	Net loss of wetland area On-going restoration activities on acquired wetlands

4	**Kwinana Freeway Extension (Thomas Road to MRS Boundary), State Planning Commission.**	Bulletin 365, Dec 1988 (Environmental Protection Authority, 1988)	Function of any wetlands that are destroyed are re-established elsewhere.	Net loss of wetland area On-going restoration activities on acquired wetlands
5	**Stirling-Harvey redevelopment scheme including changes to the Harris Dam project, Water Corporation.**	Bulletin 950, Sept 1999 (Environmental Protection Authority, 1999a)	Acquire land for incorporation into the conservation estate, State Forest or water reserve system to increase security and protection of native vegetation complexes impacted by previous land use activities. The EPA recommended this be done prior to and during construction of the dam. Substantial resourcing of the restoration of the Harvey River and its tributaries through the Harvey River Restoration Trust to facilitate the restoration of ecological processes and communities lost through previous land use activities	Net loss of vegetation due to unforeseen complications with transfer of land to conservation estate.
6	**Lancelin-Cevantes Coastal Road**	Bulletin 1053 July 2002 (Environmental Protection Authority, 2002b)	Provide funds to the Conservation Land Trust to purchase land for Conservation Estate (based on developed rural land value for the local area) and the extant of the native veg. Cleared – 220 hectares; Relinquish half of gazetted road reserve	Net Loss of vegetation Funds to be provided to DCLM by proponent for DCLM to select and

			(#17250) adjacent to Nilgen Nature reserve (34 ha); Relinquish gazetted road reserve (#17252) & incorporate into Wanagarren Nature reserve (68 ha); Closure of informal tracks which cross coastal road alignment.	purchase offset.
7	**Transmission Line from Pinjar Gas Turbine to Cataby Substation**	Bulletin 1046 April 2002 (Environmental Protection Authority, 2002d)	Prepare a management plan that addresses a system of environmental offsets to ensure no net loss of conservation estate. Plan was endorsed by Conservation Commission and provides for the Commission to acquire additional areas of remnant vegetation for inclusion in the conservation estate.	Net loss of vegetation, even though proponent donated funds to purchase similar vegetation type that is double the area impacted plus funds for management: Quality may be improved.
8	**Superlot Subdivision Lots 4 and 105, Underwood Avenue, Shenton Park**	Bulletin 1099 May 2003 (Environmental Protection Authority, 2003c)	The Proponents are required to set aside a conservation area through conservation covenant or vesting. This conservation area is to be 12 hectares, out of a total area of approximately 32 hectares of 'good' bushland as identified under Perth's Bushplan.	Net Loss of vegetation
9	**Titanium Minerals Mining and Rehabilitation Reserve 31900 Yarloop**	Bulletin 944 July 1999 (Environmental Protection Authority, 1999b)	Securing adjacent area of 9ha of privately owned land with Floristic Community Type 20b for inclusion in Conservation estate; Fencing of vegetation Restoration of 6.9 hectares of degraded vegetation (Impact area of development is 6.1 ha)	Net Gain of 0.8 hectares through restoration activities (if restoration outcome is successful)

10	**Mining of Gypsum within Chinocup Class A Nature Reserve Pingrup, Shire of Kent**	Bulletin 435 Dec 1996 (Environmental Protection Authority, 1996)	Proponent to transfer 32 hectares of private land into Lake Chinocup Reserve	Net loss: No offset undertaken to date and current mining activities are in breach of EPA conditions
11	**Wastewater disposal, Busselton Wastewater Treatment Plant Queen Elizabeth Avenue, Busselton**	Bulletin 945 Dec 1999 (Environmental Protection Authority, 1999c)	Proponent (Water Corporation) committed $1 million to assist dairy farmers reduce nutrient runoff into Geographe Bay	Success: greatly reduced diffuse nutrient load entering Geographe Bay.
12	**Ludlow Titanium Minerals Mine, 34 Kilometres South of Bunbury**	Bulletin 1098 May 2003 (Environmental Protection Authority, 2003b)	Funds provided for the following: Acquisition of additional lands for long-term conservation of Tuart. Other Tuart conservation measures, including additional research and development of management plans	No results yet, but probably net loss because of no restoration program included in commitments.
13	**Champion Lakes Masterplan Development. Lake Road Armadale**	Bulletin 1100 June 2003 (Environmental Protection Authority, 2003a)	Wetland Mitigation Strategy incorporating monitoring of present biodiversity. If monitoring establishes a significant decrease in the biodiversity and abundance of fauna occurring in the body of Wright Lake, this will trigger the proponent to provide further offset requirements within the wetland mitigation strategy for replacement of habitat values lost. This could	Net loss of wetland area No results yet

			include acquisition of equivalent wetland and buffer	
14	**Abernathy Road-Tonkin Highway On-ramp. Public Environmental Review.**	Public Environmental Review April 2003 (Main Roads Western Australia, 2003)	After considering three options for offsets (rehabilitation of offsite bushland and wetland areas, and acquisition of a nearby wetland), Main Roads is now advancing a package of comprising the relinquishment of a section of land (Lot 109 Clifford St), originally purchased for road utility purposes, and transfer ownership to a suitable management agency for conservation purposes. This land is 0.45ha greater than the impact area, which is 1.4 ha.	Net loss of wetland area
15	**Ord River Irrigation Area Stage 2 (M2 Supply Channel), Kununarra Part 2 – Management,**	Bulletin 1016, May 2001 (Environmental Protection Authority, 2001a)	The Governments of WA/NT shall create the following conservation reserves within two years, (not subject to proponent compliance) Livistona Range Conservation Area Pincombe Range Conservation Area Ninbing Range Conservation Area Weaber Range Conservation Area Mt Zimmerman Conservation Area Spirit Hills as National Park; and Western Legune as National Park	Proponent withdrew from project. Project is 'warehoused', state governments may still create conservation reserves.
16	**Kennedy Park Estate**	Department of Conservation and Land Management (DCLM) Nov 2002	Funds provided by proponent for clearing of the endangered ecological community 'sedgelands in Holocene dune swales'. Funds to be used by DCLM to conserve other examples of sedgelands in Holecene dune swales.	Net Loss of endangered ecological community Funds received.

17	**Lot 12 Marmion Ave, Jindalee**	Department of Conservation and Land Management (DCLM) March 2003	Funds provided by proponent for clearing threatened ecological community type 26a and other threatened species and communities. DCLM determined no realistic prospect for conservation on site, as such conservation actions elsewhere represent the most practical outcome.	Nett Loss of threatened ecological community and other threatened species and communities Funds received.
18	**Gorgon gas processing complex on Barrow Island nature reserve**	July 2003 Bulletin 1101	Net conservation benefits. As part of the Gorgon development concept, the Gorgon Venture plans to establish the "Gorgon Environment Foundation". This Foundation would coordinate a range of significant conservation programs that would enhance Western Australia's conservation estate and provide wide-ranging, long-term benefits to the community.	Assessment in progress, if approved than a net loss of native vegetation will result.

Chapter Five Results and Discussion

5.0 Introduction

This chapter will provide a synthesis of results and discussion from the questionnaire, literature review and outcomes from current use of offsets in WA. The research question, 'How can an native vegetation offset policy contribute to a 'no net loss' of vegetation quality and quantity' will be addressed as well as other issues identified throughout this thesis.

5.1 Results and Discussion Regarding Questionnaire

This section will detail each question through the previously mentioned coding practice in Chapter 2. The responses to the questions were analyzed individually, than coding was used to highlight themes and patterns in the responses. Information from the literature review and the current offsets examples will be used to augment the discussion of each question.

5.1.1 Question 1.

Table 5.1: Question 1: Is the current knowledge of vegetation quality and quantity sufficient in your opinion to adequately use the offset mechanism? (Figures in brackets represent percentage of respondents)

Current knowledge of vegetation quality and quantity sufficient to use offsets	Illustrative questionnaire results/emergent themes
Quantity yes (100%)	Quantity knowledge is OK. GIS imaging does produce a rough idea of vegetation cover.
Quality can only be judged on site (100%)	Quality is based on individual site assessment. We cannot wait for knowledge of quality to improve, we have to assess individual site quality.

All respondents stated that the current knowledge of vegetation quantity is adequate to use the offset mechanism. However, on the question of quality, all respondents said that vegetation quality information can only be gained through individual site assessment, and to wait for better information would be counter-productive.

In NSW, possible solutions to a lack of accurate and sufficient data on native vegetation include further research and an incremental introduction of the policy, to areas where knowledge is good (Department of Land and Water Conservation, 2001). In Victoria, the site-based habitat hectare approach acknowledges the lack of comprehensive qualitative data regarding native vegetation across the state (Department of Natural Resources and Management, 2002).

5.1.2 Question 2.

Table 5.2: Question 2: Are the proposed offset mechanisms sufficiently adequate/comprehensive to replace, replicate or recreate native vegetation quality and quantity? (Figures in brackets represent percentage of respondents)

Offset mechanisms sufficient to replace vegetation quality and quantity	Illustrative questionnaire results/emergent themes
Offsets cannot replicate ecosystem complexity (70%)	It is impossible to replicate or recreate native vegetation.
Offsets could assist less degraded areas only (30%)	The more heavily disturbed the vegetation is, the harder it is to return it to its natural state. The greater transformation you expect from an offset site the greater the risk involved. You should try to limit your offset arrangements to areas of similar condition.

70% of respondents answered ‘no’ to offset mechanisms being able to replace, replicate or recreate native vegetation quality and quantity. 30% of respondents highlighted that the greater the disturbance, the more difficult it is to return to pre-disturbance levels, and that offsets could assist less degraded areas only. It was also noted that offset mechanisms should be limited to areas of similar condition.

However recent work done by mining companies and Kings Park Botanical Gardens has demonstrated that intensive restoration efforts do yield results (Dixon, B. 2003, pers. comm., 15 July). It is also within current capabilities to restore vegetation structure and function to a lesser degree and assist the conservation of biodiversity and land degradation problems (Hobbs, 1993).

In Victoria, revegetation or restoration as the only means of offset will generally be an option for offsetting lower quality or lower significance losses. If the vegetation is characterized as high significance, any loss has to be offset by improvement and protection of comparable vegetation (Department of Natural Resources and Management, 2002).

5.1.3 Question 3

Table 5.3: Question 3: Should offset requirements be based on a case-by-case basis or through ratios common across a region or state? (Figures in brackets represent percentage of respondents)

Offset requirements based on case-by-case basis or through ratio's across a region or state	Illustrative questionnaire results/emergent themes
Ratios across region and state ((70%)	Ratios are less risky. Ratios need to be established for a set period than reviewed. More likely to get a lesser offset outcome if you do not have minimum statewide standards
Both case-by-case and ratios (30%)	Case-by-case relies on expertise of person doing assessment and expertise and knowledge varies widely. It will always be based on case-by-case but should be based upon equitable principles and policies. Clear set of rules that apply consistently across the state, but case-by-case flexibility should be incorporated.

The answers to question 3 highlighted that 70% of those interviewed thought that offsets should be based on common ratios across a region or state. Respondents stated that ratios are less risky in terms of getting a good offset outcome, because of differences in expertise and judgments of people and agencies conducting offset assessments. 30% of respondents stated that ratios and a case-by-case basis should be employed jointly to add flexibility to the use of offsets. This was said to enable good outcomes for proponents and government when dealing with cases that may have good vegetation cover in terms of quality and quantity.

In Victoria, ratios across the region and state are supported in terms of site-based habitat quality-quantity and the level of significance of the vegetation (Department of Natural Resources and Management, 2002). The conservation significance of the vegetation is rated in relation to the outcomes for the offset. For example, very high significance vegetation would result in substantial gains, high significance would result in moderate gains and so forth.

South Australia developed a Point Scoring System (PSS) for clearing of scattered trees and vegetation, from a ratio of 10:1 to 2:1 dependent on weightings applied to the vegetation (Cutten and Hodder, 2002). This was done to provide a measure of consistency between assessments. However, assessment officers, using their experience and knowledge, may consider vegetation has a higher or lower habitat value than is indicated by the PSS. In such cases, the reasons will be presented in detail in the clearance assessment report, thus providing flexibility to the system (Cutten and Hodder, 2002).

In NSW, in recognition of the difficulties of establishing consistent ratios across the state or developing a case-by-case evaluation, put forward three options (Department of Land and Water Conservation, 2001).

Firstly, regional offset ratios could be specified for each vegetation type. This ratio would be based on expert opinion, be consistent with the offset principles and be subject to community review to ensure transparency. This approach would be simple to apply and

provide certainty to proponents, but is dependent on relatively advanced knowledge of vegetation communities and their ecology.

Secondly, a case-by-case evaluation using a formula to match debits with credits could be used. This formula would show the relationship between all the relevant factors and allow offset arrangements to be calculated on a case-by-case basis. This approach could be used when regional vegetation knowledge is poor and would allow offset arrangements to be tailored to each site. However, it would be more costly to administer than ratios and the offset requirement would be difficult to predict until the proponent had done detailed investigations.

Thirdly, instead of carrying out the offset action themselves, proponents could give funds to a government agency to administer an offset system. The amount of money required would be based on one of the two approaches above. This approach could be simplest for the proponent and may be more economically efficient and environmentally effective.

Currently in WA, a case-by-case evaluation is used in the absence of offset principles and criteria (see Chapter Four). This has caused some problems for proponents and regulators alike in terms of equity, because offsets are negotiated case-by-case and there is sometimes disagreement on the relative value of the conservation ‘asset’. (Atkins, K. 2003, pers. comm., June 16).

5.1.4 Question 4.

Table 5.4: Question 4: Can the lack of active ecological management of native vegetation, leading to its decline in quality/quantity, be addressed through offsets? (Figures in brackets represent percentage of respondents)

Can offsets address decline in quality and quantity of native vegetation	Illustrative questionnaire results/emergent themes
Cannot quantify decline (20%)	Difficult to quantify gradual decline in vegetation values. My concept of offsets is to identify different types of values then try to replace them, i.e., hydrological, biological, linkage/corridor, biotic and abiotic.
Landowner responsibility (40%)	Good vegetation management should be happening anyway…to say 'we will manage this part of our bush better if you let us clear this bit,' is unacceptable and it is not an offset. Defining management expectations for bushland on private property is crucial. What do you credit people for doing? And what should they be doing anyway, and not be credited for?
Incentives will assist with decline of vegetation – not offsets (30%)	Offsets are really about making the clearing equation neutral. We expect the real gains in management of bushland to be through incentives.
Offsets can help with decline (10%)	We should be making sure that some of the mitigation is addressing existing vegetation that is decline in quality

The respondents to Question 4 identified a number of themes, including the lack of active ecological management of quality/quantity of native vegetation leading to its decline cannot be addressed by offsets because of the difficulty in quantifying impacts (20%). 40% of respondents stated that uncertainty regarding landholder responsibilities in managing vegetation leads to its decline, and that landholders should not use

management of vegetation as a tradeoff to clear. 30% of respondents indicated that incentives will assist in combating vegetation decline and offsets are more about making the clearing equation neutral. One respondent (10%) thought that offsets could be targeted to address decline in existing vegetation.

It is acknowledged in NSW and Victoria that offsets are one of a number of management tools available to address decline in quality and quantity of vegetation (Department of Land and Water Conservation, 2001, Department of Natural Resources and Management, 2002). Potential offset actions could include improvement in the quality and extent of an area of native vegetation through either restoration or better management. These outcomes can also be achieved through incentives for landholders and backed by the ever increasing information and experience in vegetation management.

5.1.5 Question 5

Table 5.5: Question 5: Who do you expect to take up or be required to take up the opportunity (requirement) to offset? (Figures in brackets represent percentage of respondents)

Who will be required to offset	Illustrative questionnaire results/emergent themes
Large landholders and capital-intensive projects (100%)	We did some financial modeling and it did confirm that offsets will be expensive, and therefore less attractive to small landholders. Public infrastructure projects (roads, dams) will more readily take on offsets than small landowners. Larger corporations should incorporate within their business planning to pre-purchase offsets. If someone is just clearing a paddock, it will be 5-10 years before they realise an

	economic return, whereas a housing development will realize a return in a relatively shorter time period.

It is clear from the results of question 5 that proponents who have capital-intensive projects are more likely to offset because of the expected cost. Other landowners will be more reluctant because of the smaller returns they get from the less-intensive use of land, like dryland cropping or grazing.

The NSW experience mirrored these emergent themes. Hypothetical case study results demonstrated that for high income, capital intensive projects the imposition of offsets is unlikely to threaten the viability of the proposal. For development proposals generating lower returns, the imposition of offsets may impact on the financial viability of those proposals (Department of Land and Water Conservation, 2001).

In Victoria, application of offset criteria (see appendix ?) will be graded according to conservation significance. Therefore, costs associated with clearing very high to high significance vegetation or large old trees will calculated at 1.5 to 2 times the loss in habitat hectares. This calculation could be a significant cost to less-intensive projects generating lower returns (Department of Natural Resources and Management, 2002).

In the current and recent offset examples in WA (see Chapter 4), all of the offsets were from major public infrastructure developments, sub-divisions or mining projects.

5.1.6 Question 6

Table 5.6: Question 6: Should 'No Net Loss' native vegetation objectives be included in your state's policy and legislative framework and if so where? (Figures in brackets represent percentage of respondents)

Should 'No Net Loss' objectives be included in your state's policy and legislative framework and if so where?	Illustrative questionnaire results/emergent themes
No (30%)	The only way you can have 'No Net Loss' is by saying 'no' to development. This will not happen so an offset policy should be aimed at minimizing loss. No Net Loss is an appalling concept, it should at least be 'Net Gain'.
Yes (70%)	No Net Loss is OK for extent of vegetation, but not for quality because we cannot accurately gauge quality of vegetation with existing resources. No Net loss is a good objective and it should be a policy, position paper or Environmental Protection Policy (EPP). No Net loss should be in Schedule 5 of the W.A. Environmental Protection Act Amendments.

Three respondents (30%) stated that 'No Net Loss' objectives should not be included in the state's legislative or policy framework. This is because they thought it simply could not be achieved, quality could not be measured adequately, or it should be re-named 'Net Gain'. Six respondents (60%), said 'No Net Loss' was an admirable objective and should be developed as a policy, position paper, or EPP. Only one respondent (10%) thought it should be within the legislative framework.

In NSW, the no net loss goal has being effectively called a 'net gain' goal (Department of Land and Water Conservation, 2001). It has not however, been placed in a official policy or legislation at this stage. Victoria has also renamed the no net loss goal into a

'net gain' goal, and has adopted the policy of offsets within a broader native vegetation framework to achieve a net gain in extent and quality of native vegetation (Department of Natural Resources and Management, 2002).

Victoria has defined Net Gain as (Department of Natural Resources and Management, 2002):

"Net Gain is the outcome for native vegetation and habitat where overall gains are greater than overall losses and where individual losses are avoided where possible. Losses and gains are determined by a combined quality-quantity measure and over a specified area and period of time. Gains may be either required offsets for permitted clearing actions or as a result of landholder and Government assisted efforts that are not associated with clearing" (NRE 2002).

5.1.7 Question 7

Table 5.7: Question 7: How do you think offset activities and their environmental values will be managed in the long-term? Who will pay and be responsible for this? (Figures in brackets represent percentage of respondents)

Percentage of respondents	How do you think offset activities and their environmental values will be managed in the long-term? Who will pay and be responsible for this?
10%	Offsets should be up and running before the project starts.
40%(Owners of land will pay for management and local government will monitor with assistance from state agencies)	In Victoria, owners of the land will pay for the management of the offset, that is the way our planning permits work. Local Governments will monitor most offsets. The weakness of the system is that the resources of Local Government to administer, monitor and enforce offsets are limited. However, we have the Native Vegetation Permit Tracking system (NVPT), using digital map layers that tracks clearing and identifies where and what the offsets are. The NVPT will assist Local Governments.

20% (will be poorly enforced)	Offsets will be poorly enforced and monitored by government because of competing political interests. In Western Australia, we have the resource problem of sending out people to monitor and audit offsets. If you have a power station that does not do their offset properly, are you going to shut them down? No, a politically expedient solution will be organized and the environment will suffer.
20% (Proponents will pay)	I guess the proponents will pay and we will not get to codes of practice or self-regulation. Regulation will have to come from government. Offsets are not just about quantity, it is quality too. If it was just about quantity, we could monitor it through remote sensing. In mining areas, we charge on average $5000 per hectare impacted upon to assist in the management of auditing and monitoring.
10% (Location to population will affect management)	If the offset is close to population centres, like ALCOA, as opposed to out in the goldfields, the offset will get better outcomes because of public scrutiny.

Responses listed in Table 7 indicate that 20% of respondents indicated that resource issues in relation to auditing and managing offsets is a serious concern. In Victoria, 40% of respondents indicated the owners of the land will pay for management of offsets, and auditing and managing offsets will be conducted by local government with assistance of state agencies. It was also noted by one respondent (10%) that offsets should commence and be ecologically viable before development occurs. One respondent indicated that in mining, an approximate fee of $5000 per hectare impacted upon through the development is charged to the proponent to assist in auditing and monitoring by agency staff. 20% of respondents stated the proponent should pay, and 10% said if the offsets was located close to population centres, than it has a better chance of succeeding because of public pressure.

In Victoria, the management of the offsets will be paid for by the owner of the land (Department of Natural Resources and Management, 2002). Similarly, under current legislation in NSW, offset agreements will be managed and paid for by the owner of the land (Department of Land and Water Conservation, 2001).

5.1.8 Question 8

Table 5.8: Question 8: Which organization/authority will assess the requirement and extent of the offsets. (The responses to this question were divided into three sections, being NSW, Victoria and Western Australia. This is because each answer is dependent on what State the respondent works in.) (Figures in brackets represent percentage of respondents)

Which organization/authority will assess the requirement and extent of the offsets.	Illustrative questionnaire results/emergent themes
NSW (one respondent = 10%)	Offset agreements will be assessed and monitored by the Department of Land and Water Conservation (DLWC) as part of the compliance program under the NSW Native Vegetation Act (1997).
Victoria (Four respondents or 40%)	Local Government will assess offsets if the proposal is below 10 hectares. If the proposal is above 10 hectares than the Department of Natural Resources and Environment (NRE) will assess. Local Government will often refer planning permit applications to NRE for advice, even if it is below 10 hectares.
Western Australia (Five respondents or 50%)	CALM to provide advice to DEP on the suitability of the offset. For the majority of proposals in W.A., it will be the EPA through the Environmental Impact Assessment (EIA) process. The Department of Environmental Protection (DEP) needs to have a specialist branch to determine and audit offsets.

In Victoria and NSW, respondents were clear about which organization is responsible for assessment of offsets because of the formal and draft introduction of offset policies respectively.

In Western Australia, respondents differed in their responses mainly because the offset framework has not yet been developed. With the proposed introduction of the Environmental Protection Amendment Bill 2002, and the proposed Biodiversity Conservation Act for Western Australia, the EPA and DCLM will each assess offsets, with DCLM predominantly assessing biodiversity values and the adequacy of specific offset proposals (Government of Western Australia, 2002).

5.1.9 Question 9

Table 5.9: Question 9: Environment Victoria and the Australian Conservation Foundation regard offset mechanisms as 'sanctioning' vegetation loss. What do you think of this statement? (Figures in brackets represent percentage of respondents)

Environment Victoria and the Australian Conservation Foundation regard offset mechanisms as 'sanctioning' vegetation loss. What do you think of this statement?	Illustrative questionnaire results/emergent themes
Yes (40%)	You should, when considering the project, ask, 'Is it justified in regard to environmental acceptability, and on social and economic need?' If it is justified, than ask, 'How has the impact been minimized?' Then, if all that has been done and clearing is unavoidable than as an absolute last resort use offsets. Absolutely. Yes I think they are right in saying that. The danger is that we can misuse the whole idea and it is our fear that it is going to be used as a easy way to get developments through.

No (60%)	I can understand the anxiety because our current regulations allow a certain level of clearing. It does not matter how you write the words, because there is an assumption that "OK, as long as I can offset I will be allowed to clear". But if you read the Victorian Framework, it doesn't say that at all. The Framework sends the message that offsetting is not going to be as easy or cheap as some people think. You will always have clearing because you always have development. Maybe we should not have the phrase 'No Net Loss' in relation to offsets because it sends out the wrong message to conservation groups. It is important that in the proposed offset policy, that it is made very clear that the negotiation and consideration of offsets does not occur until the assessment of the proposal has already been made. In reality though, this will be hard to do.

The responses to this question highlighted the unease from some respondents (40%) that offsets will be used as a justification for projects through the EIA process. Other respondents (60%) reject this by stating that offsets will not be easy or cheap. Additionally, detail in the Victorian Framework as well as the NSW Discussion Paper, referring to rules and regulations governing offsets, is often ignored when either proponents or conservation groups discuss negative aspects of offsets. Another respondent stated that it is essential that offsets only be considered after the EIA process has determined whether the project proceeds. This will ensure that offsets are not used as a means to proceed with development when otherwise the development could not be approved.

5.1.10 Question 10

Question 10: Please outline your relevant experience in this area and your qualifications. All respondents had a least 10 years experience in natural resource management, and in particular native vegetation issues. All had a university degree or higher qualifications in science. Science degrees ranged from Botany, Agricultural Science, Zoology, Environmental Science to Marine Biology and Toxicology.

5.2 Summary Of Results From Questionnaire

The following points summarize the questionnaire results, including;

- Current knowledge of quantity of native vegetation is adequate to use an offset mechanism
- Current knowledge of quality of native vegetation is poor, but determining offsets can be adequately based on individual site assessments. To wait for knowledge of quality to improve could be counter-productive.
- Offset requirements should be based on a combination of ratio's common across the state and case-by-case flexibility for best environmental outcomes.
- Offset mechanisms can address decline in vegetation through requiring proponents to manage individual sites or by contributing to natural resource management projects. However, offset mechanisms are more to do with making the clearing equation neutral. The real gains in improving quality of vegetation are through targeted incentive measures and clarification of roles and responsibilities for landowners.

- Capital-intensive projects are more likely to be able to provide realistic offsets because of costs.
- No net loss native vegetation objectives should be included in WA's policy framework, although consideration should be given to adopting a 'net gain' approach or to minimizing loss if offset mechanisms and complementary programs cannot realistically achieve no net loss.
- Management of long-term environmental values of offsets requires adequate monitoring and resourcing by regulators and proponents should pay for management.
- Current agency responsibility in WA should continue in regard to assessment of requirement and extent of offsets.
- Offset mechanisms will not sanction vegetation loss if mechanisms are based on strong criteria, principles and enforcement measures. There is, however, the fear that offsets will be misused in marginal cases to assist development approval.

5.3 Discussion Of Other Issues Relating To Native Vegetation Offsets

Through the literature review and questionnaire/interview process with native vegetation policy practitioners, other issues arise that require discussion. These include:

1. Use of offset measures that are credible to achieve 'no net loss' goals.
2. Development of a compliance tracking system to ensure ready and transparent evaluation of offsets.
3. Use of the precautionary principle in regard to scientific uncertainty to minimize potential problems.

4. Regulations governing offsets

5.3.1 Use of offset measures that are credible to achieve 'no net loss'.

The major forms of offsets currently used in WA include:

- Securing existing natural habitats for inclusion in the conservation estate.
- Establishing a restrictive conservation covenant over a portion of land to be sub-divided.
- Native vegetation restoration works
- Donation of funds for either specified or general biodiversity projects.

Often offsets use more than one of the above forms of offsets in one development proposal. For example, the Stirling-Harvey Harris Dam example in Chapter Four (Environmental Protection Authority, 1999a) offset commitments included acquisition of land as well as donating funds to Harvey River Restoration Fund to be used for restoration works within the area.

5.3.1.1 Securing existing natural habitats for the conservation estate.

Securing existing natural habitats, through purchase, lease or covenanting for inclusion in the conservation estate is part of current offset practice in Western Australia. One example is the Lancelin-Cervantes Road project (Environmental Protection Authority, 2002b). The proponent provided funds to purchase land for the conservation estate as well as relinquishing land for incorporation into specific nature reserves.

The government agencies objective when negotiating this type of offset is to provide additional security for particular priority vegetation types and areas. This is done by purchasing land containing the vegetation type and incorporating it into the conservation estate. This form of offset does not result in a no net loss of native vegetation.

As mentioned previously in Chapter Four, if an area of land and vegetation type is cleared, and is offset by securing an equal amount of land and vegetation type for the conservation estate, than a net loss of vegetation has occurred. It would only be considered a 'no net loss' if the land secured is able to be cleared. However, with the proposed Environmental Protection Act (1986) Amendments (see Chapter 4), it is likely that clearing of identified vegetation types (vegetation types considered under-represented) will be reduced. Also, if the area of land and vegetation type was cleared, and is offset by securing more land than what was cleared, than again this would be a 'no net loss' offset.

5.3.1.2 Sub-division Conservation Covenants

Providing a conservation covenant over a proportion of the land being sub-divided and developed is another form of offset. Conservation covenants are voluntary mechanisms that can be binding and non-binding, short term, long term or for a set period. For example, the proponents of Superlot Subdivision Lots 4 and 105, Underwood Avenue, Shenton Park (Environmental Protection Authority, 2003c), are required to permanently set aside a conservation area through conservation covenant or vesting. This conservation

area is to be 12 hectares, out of a total area of approximately 32 hectares of ‘good’ bushland as identified under Perth’s Bushplan.

This example is representative of the economic realities of development and sub-division practices. Clearly, a proponent cannot cede a majority of the land if a profit is to be made, and the government cannot purchase all sub-divisible land not zoned for conservation purposes with regionally significant vegetation.

The Kennedy Park Estate and Lot 12 Marmion Avenue, Jindalee sub-division examples, cited in Chapter Four, committed funds to the conservation actions elsewhere to conserve other examples of the threatened ecological communities cleared in these sub-divisions. This does not provide a no net loss in terms of quantity, but it may improve the quality and/or chances of survival of other examples of this type of vegetation.

5.3.1.3 Native Vegetation Restoration Works

Providing funds for restoration works is another form of offset, and has been used in conjunction with other measure to achieve a no net loss of vegetation quality and quantity. For example, the Yarloop mining project (Environmental Protection Authority, 1999b) commitments including restoration of a rubbish tip, fencing of reserves and securing land for the conservation estate.

Restoration of degraded vegetation can definitely contribute to a no net loss of native vegetation quality and quantity, although temporal problems exist in terms of

replacement of biodiversity values and ecosystem function (see point 6.1.4. Chapter Six). Indeed, restoration offsets could be viewed as a driver for increased restoration efforts in WA.

Restoration of native vegetation is the only offset mechanism that can increase the extent of native vegetation, as well as create buffers around remnants, provide corridors between isolated remnants and contribute to reversing land degradation issues. In terms of quality though, outcomes through restoration are less certain (Hobbs, 1993).

Increased focus should go to larger landscape scale restoration projects. Offsets may be able to contribute to funding strategic landscape scale restoration projects, like the Dongolocking Project (Wallace, 1998). Other opportunities could include funding restoration and corridor projects like the Gondwana Link Project in the south of WA (ref/)

5.3.1.4 Funds For Biodiversity Protection And Enhancement Projects (BPEP's)

Donation of funds to biodiversity protection and enhancement projects (BPEP's) is another example of an offset mechanism. Examples include funding research for Tuart conservation measures (Environmental Protection Authority, 2003b) and the Stirling-Harvey redevelopment scheme which provided funds to the Harvey River Restoration Fund for the restoration of ecological processes and communities lost through previous land use activities (Environmental Protection Authority, 1999a).

Funding BPEP's can increase the quality of native vegetation and biodiversity, and therefore contribute to the no net loss of native vegetation quality.

5.4 Development of an Auditing and Compliance System

It has been demonstrated, to ensure ready and transparent evaluation of offsets, an auditing and compliance tracking system is essential for all environmental offset programs, including native vegetation offsets, to ensure proper long-term management. The United States wetland offset program found that monitoring, maintenance and follow up by regulatory agencies resulted in more successful wetland offset projects (Johnson et al., 2002).

In Victoria, a Native Vegetation Permit Tracking System (NVPT) will assist in monitoring offset compliance using digital map layers that tracks clearing and identifies where and what the offsets are in order to assist on-ground site assessment (Department of Natural Resources and Management, 2002).

For a native vegetation offset mechanism to work effectively in WA, a compliance tracking system is essential to monitor offsets progress and compliance.

5.5 Scientific Uncertainty.

Analysis of the United States wetland offset program identified that scientific uncertainty relating to replacement of wetland value and function was a serious issue (Murtough et al., 2002). It is likely that scientific uncertainty will be a similar concern with native

vegetation offsets in WA, especially in regard to restoration offsets and equivalence (like for like) issues.

Possible solutions to scientific uncertainty from the United States wetland offset experience include

(Adler, 1999; Johnson *et al.,* 2002; Kentula *et al.,*1992; Young *et al.,* 1996):

- Some schemes have required offset activities to occur before impact on the permitted wetland occurs. This has been attempted to ensure the proposed offset actually results in a viable wetland because of the relative high failure rate of recreated value and function in artificial and restored wetlands and the substantial risk of significant harm if wetlands are destroyed before effective and sustainable offset credits have been generated.
- Typical offsets are required in the same biotic and hydrological basin. This increases the chance for like for like tradeoffs being made.
- A conservative ratio is used to specify the exchange rate at which wetland destruction must be offset by wetland improvements. For example, an offset ratio may require 2 hectares for 1 hectare of destroyed wetland, and/or additional offsets required if endangered species or a strategic area is to be impacted.

These possible solutions can be incorporated into an offset framework in WA to counter scientific uncertainty in regard to developing offset ratios, equivalence measures and initiating some projects before clearing.

5.6 Offset Regulations

Regulations governing offsets should not be too complex or inflexible. It was found in the United States Clean Air Act (1970) offsets that complex or inflexible regulations could jeopardize potential environmental outcomes. The permit process within the New Source Review (NSR) program can add a year or more to the time needed to review proposed plant modifications. As a result, many companies delay or abandon plans to modernize their facilities in ways that would benefit the environment (U.S. Environmental Protection Agency, 2003).

Similarly, the New South Wales Farmers Federation (NSWFF) state that many of the principles in the proposed offset policy in NSW are too inflexible, and may harm environmental benefits. For example, in relation to Principle Three of the NSW Discussion Paper, that an offset agreement should not lead to permanent environmental costs, the NSWFF report that this will lead to an overly restrictive policy because nature cannot be predicted. Some offsets will succeed and others will fail, therefore what is required is a flexible offset approach that reflects the likelihood that some offsets will exceed expectations and others will disappoint. What is required is a net balance and flexibility (NSW Farmers Association, 2001).

In regard to offsets in WA, a balance needs to be achieved to ensure flexibility and simplicity to achieve best environmental outcomes, but not be open to the risk that offsets be used in inappropriate situations and therefore compromise environmental objectives.

A solution could include development of offset criteria that incorporates flexibility for areas with good vegetation representation. This is explored further in Chapter Six.

Chapter 6 Conclusions and Recommendations

6.0 Introduction

This chapter will outline conclusions and recommendations for the thesis and answer the research question. Principles for the operation of a native vegetation offsets policy in Western Australia will also be nominated.

6.1 Research Question

The research question is: How can a native vegetation offsets policy in Western Australia contribute to no net loss of vegetation quality and quantity.

A native vegetation offsets policy can, if structured in ways that limit the underperformance of other environmental offsets discussed in this paper, contribute to reducing the net loss of native vegetation quality and quantity in Western Australia. There are five key ways a proposed offset policy could do this, including:

- Nominating criteria for native vegetation offsets
- Recognition that offsets and the impact assessment process should be kept separate
- Equivalence: Like for like or like for better
- Awareness of temporal problems associated with restoration offsets
- Develop principles for native vegetation offsets that guide their application.

6.1.1 Criteria for Native Vegetation Offsets

As demonstrated in this thesis, the major ways for offsets contributing to no net loss of quantity and quality of native vegetation is through restoration and funding biodiversity protection and enhancement projects (BPEP's). Simply securing and better protecting vegetation within the conservation estate does not contribute to no net loss. Therefore, Table 6.1 attempts to provide offset formulae based upon the calculated loss habitat hectares approach from Victoria.

Calculated loss is a site-based measure of quality and quantity. If it is assumed that an unaltered area of natural habitat is at 100% of its natural quality, than one hectare would be equivalent to one habitat hectare. That is, the quality multiplied by the quantity. For example, ten hectares of this high quality habitat would be equivalent to ten habitat hectares. If an area of habitat had lost 50% of its quality (through, for example, threatening processes like weed invasion or grazing), than one hectare would be equivalent to 0.5 habitat hectares (Department of Natural Resources and Management, 2002). This enables a calculation of net outcomes for vegetation offsets.

To ensure that net outcomes are positive for areas with less than 50% remaining of pre-1829 vegetation representation, Table ? provides formulae to maximize protection of these areas. For example, if the calculated loss of an area (with 30-50% pre-1829 vegetation is remaining) is ten habitat hectares, than fifteen habitat hectares is required as an offset if approval is given to clear. This is because areas with 30-50% of vegetation remaining is multiplied by one and a half (1.5) times.

Extent of Vegetation Remaining	Offset Type	Offset Formula	Outcome
50% or greater remaining of pre-1829 vegetation representation	A combination of funding for restoration or contributing to existing or proposed biodiversity protection or enhancement projects (BPEP's) as determined by Government	% of total development costs or 1:1 ratio of values	Allow net loss
30%-50% remaining of pre-1829 vegetation representation	A combination of funding for restoration, securing land or contributing to existing or proposed biodiversity protection or enhancement projects (BPEP's) as determined by Government	At least one and a half (1.5) times the calculated loss of the amount of area cleared or impacted on.	No net loss
10% - 30% remaining of pre-1829 vegetation representation	A combination of funding for restoration, securing land or contributing to existing or proposed biodiversity protection or enhancement projects (BPEP's) as determined by Government	At least two (2) times the calculated loss of the amount of area cleared or impacted on. Any loss be offset by improvements and protection of comparable vegetation.	No net loss
10% remaining of pre-1829 of the vegetation representation	A combination of funding for restoration, securing land or contributing to existing or proposed biodiversity protection or enhancement projects (BPEP's) as determined by Government	At least three (3) times the calculated loss of the amount of area cleared or impacted on. Any loss be offset by improvements and protection of comparable vegetation.	Net Gain

Table ? Nominated Criteria for Native Vegetation Offsets

Additional notes explaining each criteria are listed overleaf.

- 50% or greater remaining of pre-1829 vegetation representation

When clearing in an area where 50% or greater remains of pre-1829 vegetation representation, the offset is to be a monetary percentage of the total development to be contributed to a strategic vegetation trust fund. For instance, if a development occurs in an area of well-represented vegetation, than a percentage of that development could be paid to a fund for managing or recreating additional vegetation in marginal areas (less than 30%), but with flexibility to ensure best environmental outcomes. Funds could also be used in areas where biodiversity and land degradation issues require funding.

- 30% - 50% remaining of pre-1829 vegetation representation

Clearing in an area of between 30% – 50% of pre-1829 vegetation representation remaining requires offset of at least (1.5) one and a half times of the calculated loss of the amount of area cleared or impacted on. The issue of equivalence (in terms of vegetation type, structure, age, complexity, size soils etc) needs to be considered. If, in the view of the EPA, the offset cannot be met in terms of equivalence and function, than consideration is given to funding (1.5) one and a half times the area cleared plus management costs for a specified time.

- 10% - 30% remaining of pre-1829 vegetation representation

Clearing in an area of between 10% - 30% of pre-1829 vegetation representation remaining requires an offset of (2) two times the calculated loss of the area cleared or impacted upon. Again the issue of equivalence needs to be considered, and in vegetation types with between 10% - 30% of pre-1829 vegetation representation remaining is even

more crucial. Any loss should be offset by improvements and protection of comparable vegetation.

- 10% or less remaining of pre-1829 of the vegetation representation

Clearing in an area of less than 10% of pre-1829 of the vegetation representation remaining requires an offset of (3) three times the calculated loss of the amount cleared or impacted upon. Equivalence is a critical issue with these vegetation types and any loss should be offset by improvements and protection of comparable vegetation.

6.1.2 Separation of the Assessment Process and Offsets

The sequential framework of avoidance – minimization - offset is an essential approach to environmental protection of native vegetation. However, there is a danger of the assessment and offset processes becoming entwined, especially when a clearing application is marginal (i.e. in an area which is significantly cleared or minimally reserved) and/or the proposal has strong economic or social appeal. The above criteria in section 6.1.1 should assist in alleviating this problem, together with the expected benefits of reducing clearing in marginal areas from the proposed Environmental Protection Amendment Bill (2002).

Nevertheless, there will still be anxiety (from both government agencies and conservation groups) regarding some clearing/offset arrangements, especially in regard to threatened ecological communities and other significantly cleared or minimally reserved vegetation types.

It has been demonstrated in this paper that some current offset practices in WA (see Chapter 4) appear to be considered at the beginning of and through the assessment process and become interlinked at the encouragement of government agencies that are attempting to secure the best environmental result. The Gorgon development proposal on Barrow Island is a case in point (Environmental Protection Authority, 2003c). This proposal canvassed the concept of 'net environmental benefit' at an early stage to offset the expected impact on the Barrow Island Nature Reserve (although the EPA stated later that 'net conservation benefit' was distinct from offset measures, see Chapter One, p.6).

Similarly, the transmission line from Pinjar Gas Turbine to Cataby Sub-station proposal (Environmental Protection Authority, 2002d) discussed offset arrangements at the beginning of the assessment process (Morrell, J. 2003, pers. comm., 30 June). Some threatened species clearing applications through DCLM have also discussed offsets at the beginning of the proposal to negotiate the best environmental outcomes (Atkins, K. 2003, pers. comm., 16 June).

These three examples illustrate that it may be difficult to separate consideration of offsets from the assessments of impacts, and in some cases, where the proposal to clear is not within a significantly cleared or minimally reserved vegetation type, the separation may have little or no impact on the environmental outcomes of the proposal.

An ancillary approach could be to further encourage individual developers to bank 'offsets' in lieu of future expected developments. An example of this is Main Roads WA, which can predict future required works and therefore strategically purchase potential offset sites. The proposal would still be assessed within existing guidelines and principles but may offer benefits for both proponents and government through lower costs for the proponent and more strategic acquisition of environmental assets for government.

6.1.3 Equivalence: Like for Like or Like for Better

It is not possible to have true equivalence between an area cleared in one location and the offset in another location. Factors including the extent or size of the vegetation, vegetation structure and type, soils, topography and other spatial elements can be different from one location to another. To ensure a no net loss of vegetation quality and quantity, a general rule of thumb should always be 'like for like or like for better'.

However, determining equivalence is a complex task. The 'Habitat Hectare' example from Victoria is rigorous in terms of determining quality and quantity for offsets, and may be able to be extrapolated to the Western Australian experience (see recommendation on page129).

6.1.4 Temporal problems associated with restoration offsets

In proposals where restoration works are used as an offset mechanism, major temporal problems exist in terms of replacement of habitat values, biodiversity values and ecosystem functions. While clearing has an immediate impact, recreating natural ecosystems can take many years and the outcomes are uncertain (Hobbs, 1993). For example, values like tree hollows can take 100 years to develop, and where salinity and groundwater are concerned, the impacts of clearing and the benefits of restoration can take decades to appear (Department of Land and Water Conservation, 2001).

In terms of no net loss of native vegetation quality and quantity, this is a major problem with offsets. NSW proposes that offsets should only be applied when (Department of Land and Water Conservation, 2001);

- The values lost can be replaced at least as rapidly as they are lost (eg. fast responding acquifers, improved management of existing vegetation)
- Where the loss of values causes no permanent harm (eg. clearing of young re-growth in well vegetated regions)
- Where clearing is postponed until the offset action is fully functional
- Where time lags are short and the risk is manageable, it may be possible to compensate for time lag by increasing the number of offset credits required

These points addressing temporal issues may be appropriate in some areas, but will only partially contribute to no net loss. In Victoria, temporal problems associated with restoration offsets will be addressed through a graded response, from formally initiating

offsets prior to clearing taking place, to initiating offsets as soon as seasonally practicable (Department of Natural Resources and Management, 2002). This response from Victoria to temporal problems in relation to restoration offsets is far from ideal but probably the most realistic and pragmatic.

6.1.5 Guiding Principles For Native Vegetation Offsets

The following section details the major principles for a native vegetation offset policy framework, in order to contribute to a no net loss of native vegetation quality and quantity. Principles within an adopted policy will assist the EPA in their assessment of offsets. The principles are;

- The outcome of an offset program must contribute to a no net loss of native vegetation quality and quantity and be a net environmental improvement.
- Environmental impacts must be avoided and/or minimized by the use of best practice measures.
- Offsets should be viewed as one mechanism within a suite of mechanisms (incentive and regulatory) that can be used to facilitate no net loss of vegetation quality and quantity.
- All existing regulatory requirements and best environmental practice must be met.
- Offsets cannot compensate for failure to meet best practice or poor environmental performance.
- Offsets must be consistent with other government policies, plans and programs.

Offsets must be (NSW Environmental Protection Authority, 2002);

- enduring - they must offset the impact of the development for the period that the impact occurs
- quantifiable - the impacts and benefits must be reliably estimated
- targeted - they must offset the impacts on a 'like for like or better' basis
- supplementary - beyond existing requirements and not already being funded under another scheme
- enforceable - through development consent conditions, licence conditions, covenants or a contract.

6.2 Recommendations

This section will outline the recommendations developed through the results, discussions and conclusions in this paper.

6.2.1 Aims and Objectives for Offsets

It is important to clearly articulate the aims and objectives of a native vegetation offsets policy to provide clarity for proponents, regulators and public alike. Consideration should be given to nominating desired no net loss or net gain strategic and operational outcomes of offsets, in terms of:

- Land degradation issues
- Biodiversity and habitat protection
- Goals of restoration offsets (buffers, connectivity)
- Goals for managing decline of native vegetation
- Threatened ecological communities and species

6.2.2 Develop Principles for Offsets

Develop principles for offsets that can be considered by the Environmental Protection Authority within the environmental impact assessment process to provide consistency and a strategic approach to offsets.

6.2.3 Develop Comprehensive Criteria For Offsets

Comprehensive criteria are required to ensure offsets achieve no net loss objectives in terms of quality and quantity of native vegetation. The criteria developed in this paper is based upon the 'Habitat Hectares" approach in Victoria. Clearly though, criteria based on Western Australian conditions and experiences needs to be developed.

Consideration should be given to DCLM developing separate or equivalent criteria for the proposed Western Australian Biodiversity Conservation Act in relation to threatened ecological communities and threatened species.

6.2.4 Develop A Compliance Tracking System For Offsets

A compliance tracking system for offsets is required to assist in enforcement and transparency. Existing auditing and compliance mechanisms need to be evaluated to determine how effectively they can track offsets and decide if additional measures are required.

6.2.5 Develop and Implement an Offset Consultation Strategy

A native vegetation offset consultation strategy be developed to ensure all stakeholders have an opportunity to contribute to the development of an offset policy. Stakeholders would include government agencies, public infrastructure proponents, landholders, mining organizations, conservation groups and the general public.

6.2.6 Analysis of Complementary Native Vegetation Incentives

It has been discussed in this paper that offsets and incentive measures for landholders can both contribute to a no net loss of native vegetation quality and quantity. It would be

useful for further analysis to be conducted on how these mechanisms can be complementary and therefore better facilitate improvements in vegetation retention and management.

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Mr Chris Tallentire, Conservation Council of Western Australia.

Appendix Two: Interview Questions

Interview Questions

Ecological

1. Is the current knowledge of vegetation quality and quantity sufficient in your view to adequately use the offset mechanism?

2. Are the proposed offset mechanisms sufficiently adequate /comprehensive to replace/replicate/recreate native vegetation quality and quantity

3. Should offset requirements be based on a case-by-case basis or through ratio's common across a region or state?

4. Can the lack of active ecological management of native vegetation, leading to its decline in quality/quantity, be addressed through offsets?

Economic

5. Who do you expect will take up or be required to take up the opportunity (requirement) to offset?

Administrative

6. Should 'No Net Loss' vegetation objectives will be included in your state's policy and legislative framework and if so where?

7. How do you think offset activities and their environmental values will be managed in the long-term? Who will pay and be responsible for this?

8. Which organization /authority will assess the requirement and extent of offsets?

9. Environment Victoria and Australian Conservation Foundation regard offset mechanisms as "sanctioning" vegetation loss. What do you think of this statement?

Background of Interviewee

10. Please outline your relevant experience in this area and your qualifications.