PLANNING FOR BIODIVERSITY IN THE WIDER COUNTRYSIDE:

RECOGNISING OPPORTUNITIES, OVERCOMING BARRIERS

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ABSTRACT

Planning for Biodiversity in the Wider Countryside: Recognising Opportunities, Overcoming Barriers

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There is an increasing imperative to conserve the biological diversity of the world to ensure its future viability and integrity. The traditional approach in England has been to protect a series of small, isolated sites. Recent research has demonstrated the inadequacies of this approach, suggesting a need to direct energies more towards conservation in the surrounding wider countryside. However, there are considerable difficulties associated with achieving biodiversity objectives in the wider countryside, as there is a heavy reliance on non-statutory planning mechanisms.

Whereas solutions to biodiversity conservation have generally been seen to lie in the realm of natural science, this thesis recognises the need for a better understanding of the people, policies and activities involved in the process. It therefore couples social science perspectives with an understanding of ecological science principles, in order to investigate the issues affecting the implementation of biodiversity conservation plans in three case studies in south west England.

By employing a range of qualitative techniques this research: defines a number of conservation objectives for the study areas; uses conservation objectives as a basis for conducting a content analysis of biodiversity planning documents, in order to uncover potential implementation opportunities and barriers; presents the results in an analytical framework; explores and refines these through a series of semi-structured interviews with key biodiversity actors.

This research uncovers a complex set of interacting issues. These issues relate to partnership styles of working, building agreement and trust, variable levels of knowledge about habitat and species in the wider countryside, restoration techniques, indicative strategies, strategic targeting of resources, financial support to farmers and other land managers, the role of monitoring, and policy responses to recent agricultural crises.

The results attest to the importance of a social-scientific understanding of biodiversity planning, in particular, of the forces which drive or obstruct the implementation of local solutions. The thesis concludes with a number of recommendations, based on original evidence, aimed at improving the implementation of biodiversity plans in the wider countryside.

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of this thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Kevin Watts

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 INTRODUCTION

1.0 PURPOSE OF THESIS

This thesis centres on the conversion of a growing commitment to biodiversity conservation into action on the ground. The conservation of biodiversity has historically been based on the protection of a series of small, isolated sites; however, continuing declines in biodiversity indicate the ineffectiveness of this approach. There is now an increasing recognition of the importance of including the surrounding 'wider countryside' in future conservation strategies, and this has facilitated a more holistic view of biodiversity conservation.

Recent theories have sought to explain and predict the functional nature of the wider countryside in relation to species survival. A greater understanding of the general ecological principles operating in the wider countryside will allow the identification of key features upon which biodiversity is reliant. These scientific principles have been accepted by and incorporated within a number of biodiversity plans, which thus aim to extend conservation efforts beyond the site-based system.

In the light of inadequate planning systems, and the heavy reliance upon non-statutory planning mechanisms, there are considerable difficulties in translating biodiversity plan 'outputs' into effective 'outcomes' on the ground. The statutory planning system was developed to protect the countryside from the perceived threat of urbanisation; however, it excludes agriculture and forestry, the main drivers of land use/rural environmental change. As a result, there are few controls over the use of privately owned land and only limited incentives available to landowners. The key implementation mechanisms available for biodiversity plans rely mainly on the provision of conservation advice and a suite of voluntary management agreements.

The main focus of this research is the implementation of biodiversity plans in the wider countryside, especially those which are based on the scientific principles of landscape ecology. It has particular regard to Local Biodiversity Action Plans, as these are being relied upon to deliver the UK's commitments to biodiversity conservation and sustainable development.

Biodiversity conservation has so far been addressed from an almost exclusively natural science perspective. By contrast, this thesis takes a social science approach, in particular emphasising the need for a better understanding of the implementation process. Although the scientific formulation of biodiversity plans provides the basis for future action, biodiversity benefits will not be realised until these plans are effectively implemented on the ground.

This research enquiry has strong policy applications. Its frame of reference is the planning and management documents currently in use, and in preparation, for the 'wider countryside' in England, most of which are also relevant to the remainder of the UK and beyond. These research findings are intended to complement the limited literature on plan implementation theory, especially with regard to environmental plans, and are thus intended to be of value to both academic researchers and practitioners.

1.1 CHAPTER OUTLINE

The role of this chapter is to define and explain the nature and importance of biodiversity, and to introduce the key scientific concepts that underpin its conservation. The principle of conserving biodiversity has attracted a strong governmental commitment at global, national, regional and local levels, as have the important links between biodiversity conservation and sustainable development. The current challenge is to convert this commitment into action on the ground and this is where the focus of this research lies. The final section of this chapter sets out the research aim and objectives along with the thesis structure.

1.2 BIODIVERSITY

1.2.1 Defining Biodiversity

Biodiversity has been defined as "all hereditarily based variation at all levels of organisation, from the genes within a single local population or species, to the species composing all or part of a local community, and finally to the communities that compose the living parts of the multifarious ecosystems of the world" (Wilson, 1997, p.1). It is widely recognised that there are three distinct levels of biodiversity, all of which constitute what might be regarded as the 'variety of life' (United Nations Conference on Environment and Development, 1992):

- Diversity between and within communities and ecosystems
- Diversity of species
- Genetic variation within individual species.

It must be emphasised that biodiversity is not restricted to rare or threatened species but includes the whole of the natural world from the commonplace to the critically endangered (UK Local Issues Advisory Group, 1997b). At its most basic level, biodiversity includes the full range of *species* on earth, from the smallest bacteria and viruses through to the largest plants and animals. At finer levels of organisation, biodiversity includes the *genetic* variation within these species. Finally, on a wider scale, biological diversity includes variations in the *communities* in which species live, the *ecosystems* in which these habitats exist, and in the interactions among these levels.

1.2.2 The Importance of Biodiversity

All levels of biodiversity are necessary for the continued survival of species and natural communities, and all are important for the well-being of humans (United Nations Conference on Environment and Development, 1992). According to Primack (1993) *genetic* diversity is needed by any species in order to maintain reproductive vitality, resistance to disease, and the ability to adapt to changing conditions. Genetic diversity within domestic plants and animals is of particular value in sustaining modern agricultural species. *Species* diversity represents the range of evolutionary and ecological adaptations to particular environments. The diversity of species provides people with valuable resources and resource alternatives. *Community* level diversity

defines the collective response of species to different environmental conditions, which support the continuity of ecosystem functioning, providing beneficial services to people.

Spellerberg and Hardes (1992) further illustrate the importance of conserving biodiversity in terms of its range of benefits and functions (Table 1.1). It is clear from these attributes that the conservation of biodiversity can be strongly justified in economic, moral, aesthetic and intrinsic terms. As Wilson (1994, p.269) claims "biodiversity is our most valuable but least appreciated resource".

Table 1.1 – Suggested benefits and functions of biodiversity

A. Ethical and moral values

1. Intrinsic value of nature
2. Natural world has value as a human heritage

B. Enjoyment and aesthetic values

1. Leisure activities ranging from bird watching to walking
2. Sporting activities ranging from orienteering to diving
3. Aesthetic value by way of seeing, hearing or touching wildlife
4. Enjoyment of nature depicted in art

C. Use as a resource for food, materials, research inspiration and education (utilitarian)

1. As a genetic resource for some of the following
2. As a source of food
3. As a source of organisms for biological control
4. As a source of pharmaceutical products
5. As a source of materials for buildings
6. As a source of materials for making goods
7. As a source of fuel for energy
8. Source of working animals
9. For scientific research
10. Educational value
11. Inspiration for technological development

D. Maintenance of the environment (ecosystem and climates)

1. Role in maintaining CO_2-O_2 balance
2. Role in maintaining water cycles and maintaining water catchments
3. Role in absorbing waste materials
4. Role in determining the nature of world climates, regional climates and micro-climates
5. Indicators of environmental change
6. Protection from harmful weather conditions: wind breaks, flood barriers

Source: (Spellerberg and Hardes, 1992).

1.3 COMMITMENT TO BIODIVERSITY CONSERVATION

1.3.1 Global Commitment to Biodiversity

Pressure for international action to tackle the problems facing biodiversity conservation peaked at the 'Earth Summit' in Rio de Janeiro (United Nations Conference on Environment and Development, 1992) in June 1992, which saw the signing of the Convention on Biological Diversity by Heads of State and Governments. The United Kingdom was one of 150 signatories to the Convention, reflecting global concern that human activities are compromising habitats and natural ecosystems on an increasing scale, with unprecedented loss of species. The arguments for the conservation of biodiversity appear to have been widely accepted by governments across the world (Grubb *et al.*, 1993; Baldock *et al.*, 1996; UK Local Issues Advisory Group, 1997b). This global commitment to sustainable development is to be revisited and reinforced at a second world summit in South Africa in 2002.

The objectives of the Convention are concerned with the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising (United Nations Conference on Environment and Development, 1992). The Convention text places a sizeable number of obligations on signatories, one of the most important obligations being to develop, or adapt, existing national strategies, plans or programmes for the conservation and sustainable use of biological diversity. Signatories are also obliged, as far as possible and appropriate, to integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies (Baldock *et al.*, 1996).

1.3.2 UK Commitment to Biodiversity

In partial fulfilment of the commitments made at the Rio Earth Summit, the UK Government published the UK Biodiversity Action Plan (BAP) (UK Government, 1994a), which sets out the broad strategy for conserving and enhancing wild species and wild habitats in the UK for the next twenty years. "Before the publication of the BAP, there was no strategy for conserving the UK's wildlife shared by government, industry, conservation organisations and the public alike" (Biodiversity Challenge, 2001, p.2). The overall goal of the Action Plan is to conserve and enhance biological diversity

within the UK and to contribute to the conservation of global diversity through all appropriate mechanisms. The objectives of the Plan are:

1. **To conserve and where practicable to enhance:**
   a) the overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems;
   b) internationally important and threatened species, habitats and ecosystems;
   c) species, habitats and natural and managed ecosystems that are characteristic of local areas;
   d) the biodiversity of natural and semi-natural habitats where this has been diminished over recent past decades.
2. **To increase public awareness of, and involvement in, conserving biodiversity.**
3. **To contribute to the conservation of biodiversity on a European and global scale.**

The implementation of the UK Action Plan has been substantially entrusted to a system of Local Biodiversity Action Plans (LBAP), which have been promoted as a means of ensuring that the national strategy is translated into effective action at the local level.

> If the UK Biodiversity Action Plan is to be implemented successfully it requires some means of ensuring that the national strategy is translated into effective action at the local level. Local Biodiversity Action Plans are seen as a means by which such actions can be achieved. (UK Government, 1996, p.5)

The precise way in which LBAPs develop will inevitably vary according to local circumstances. The emphasis will differ at various levels in the hierarchy from regional to local, with progressively greater emphasis on implementation of conservation action at a more 'local' level, although the benefits of producing a strategic framework at 'regional' level has been recognised (UK Local Issues Advisory Group, 1997b). In developing a LBAP the UK Local Issues Advisory Group (1997b) suggest that it will be necessary to address the following six primary functions, emphasising the importance of local partnerships and ownership:

1. To ensure that national targets for species and habitats, as specified in the UK Action Plan, are translated into effective action at the local level.

2. To identify targets for species and habitats appropriate to the local area, and reflecting the values of people locally.
3. To develop effective local partnerships to ensure that programmes for biodiversity conservation are maintained in the long-term.
4. To raise awareness of the need for biodiversity conservation in the local context.
5. To ensure that opportunities for conservation and enhancement of the whole biodiversity resource are fully considered.
6. To provide a basis for monitoring progress in biodiversity conservation, at both local and national level.

Thus the production of the UK BAP has precipitated the development of LBAPs, which provide a basis for detailed action and instil a locally based partnership/ownership approach. Between them, they seek to ensure that there is a continued commitment to the conservation of biodiversity at national, regional and local levels.

1.3.3 Biodiversity Conservation and Sustainable Development

The Convention on Biological Diversity was one of several major initiatives stemming from the 'Earth Summit', which together form an International Agreement on sustainable development. Not only does the UK BAP provide direct commitment to biodiversity in its own right but the concept of biodiversity also forms an integral part of the UK Government's commitment to sustainable development (UK Government, 1994a; c; d; b).

> One of the most compelling arguments for the conservation of biological diversity is that it is an integral part of long term sustainability... Developing a programme for biodiversity conservation should be one of the core functions. (UK Local Issues Advisory Group, 1997b, p.4)

1.3.3.1 Indicators of Sustainable Development

It is apparent that the UK Government (Department of the Environment, Transport and the Regions, 1998) considers biodiversity to be an important indicator in monitoring progress towards sustainable development, and includes it within a suite of thirteen headline indicators. The Government's vision of sustainable development is based around four broad objectives, which are set out in Table 1.2 along with the draft

indicators. The Government claims that, to achieve sustainable development, each of these objectives must be addressed equally, both for present and future generations.

Table 1.2 - Proposed objectives and indicators of sustainable development

Objective	*Key issue*	Indicator
1. Maintenance of high and stable levels of economic growth	*Economic growth*	Total output of the economy
	Social investment	Investment in public assets
	Employment	People of working age in work
2. Social progress which recognises the needs of everyone	*Health*	Expected years of healthy life
	Education and training	Qualifications at age 19
	Housing quality	Homes judged unfit to live in
3. Effective protection of the environment	*Climate change*	Emissions of greenhouse gases
	Air pollution	Days of air pollution
	Transport	Road traffic
	Water quality	Rivers of good or fair quality
	Wildlife	**Populations of wild birds**
	Land use	New homes built on previously developed land
4. Prudent use of natural resources	*Waste*	Waste and waste disposal

Source: (Department of the Environment, Transport and the Regions, 1998).

The Government (Department of the Environment, Transport and the Regions, 1998) values biodiversity (termed wildlife) for its own sake and because it is an integral part of our surroundings and our quality of life. For example, *populations of wild birds* are believed to be generally good indicators of the broad state of wildlife and the countryside, as they are wide-ranging in habitat distribution and tend to be at or near the top of the food chain.

These headline indicators have been further expanded into a set of approximately 135 core indicators, published as Quality of Life Counts (Department of the Environment, Transport and the Regions, 1999; 2000a), to focus on specific issues and to identify areas for action. Within this, a suite of fifteen indicators under the heading of 'landscape and wildlife', has been developed, recognising the declines in some highly valued species, habitats and landscapes especially in farmland areas over the last 30 years. Two particularly important landscape and wildlife indicators are: trends in *plant diversity* (S3), which has the objective of signalling a reverse in the decline of wildlife and habitats; and *landscape features* (S5), which aims to indicate the protection of individual landscape features such as hedges, dry stone walls and ponds.

According to the Department of the Environment, Transport and the Regions (DETR) (1999) plant diversity is a fundamental aspect of both natural habitats and ecosystems managed for agriculture and forestry. Decreases in average numbers of species have occurred in fields, woods, moorland, hedges and streamsides, especially in lowland landscapes. The changes in different types of plants suggest that the decline reflects an overall shift towards more intensively-managed and nutrient-rich vegetation. Hedges, walls and ponds can be attractive landscape features of the countryside, providing valuable habitats for wildlife. However, these have also suffered owing to the cost of their continued management and their lessening relevance to modern agriculture. Many hedges have been removed in order to facilitate the efficient use of machinery, as farming has become more intensive.

The Government (Department of the Environment, Transport and the Regions, 1999) accepts that gradual change in the landscape is inevitable, in response to developments in agriculture, forestry and rural communities but acknowledges that the changes must be well managed and not cause unacceptable impacts on the countryside. As a result, these landscape and wildlife indicators reflect the need to conserve and enhance the wide variety of biodiversity in the UK, reversing current declines, for present and future generations.

1.4 FROM COMMITMENT TO ACTION

The current challenge is to transfer this considerable commitment to biodiversity conservation into action on the ground. This thesis aims to assist this process through a social-scientific study of the role of biodiversity plans in the wider countryside, and to illuminate the nature of opportunities and barriers to their implementation.

1.4.1 Research Aim and Objectives

The primary aim of this research is:

> *To examine the factors underlying the barriers to, and opportunities for, implementation of plans for biodiversity in the wider English countryside.*

In pursuit of this aim, the following research objectives were set:

1. Assemble evidence for the attrition of biodiversity within the wider countryside.
2. By reference to case study areas, identify the key features that landscape ecologists would wish to see conserved within the 'wider countryside'.
3. Identify relevant objectives and actions within plans for biodiversity, and assess their content in relation to the conservation of the wider countryside's key ecological features.
4. Define the relevant opportunities and barriers to the implementation of biodiversity plans in the wider countryside.
5. Analyse the opportunities and barriers to the implementation of biodiversity plans in the wider countryside.
6. Identify means of reinforcing opportunities and surmounting barriers, within the context of biodiversity planning in the wider countryside.

1.4.2 Structure of the Thesis

Chapter Two further expands on the English approach to biodiversity conservation, by exploring the historical, site-based approach and its underpinning science. It also reviews some of the important characteristics of the wider countryside and reviews some of the continuing declines in biodiversity, both within protected sites and the wider countryside.

The scientific theories underlying the importance of the wider countryside are explained in Chapter Three, in relation to the emerging science of landscape ecology, which provides a rationale for biodiversity planning. Chapter Four reviews the planning systems operating within the English countryside in order to identify the various implementation options for biodiversity plans. It also investigates the implementation process to aid the development of an analytical framework.

The research methodology is presented in Chapter Five, while Chapters Six, Seven and Eight set out and interpret the research findings. These results are further analysed in Chapter Nine, allowing the identification of key issues and generalisations.

Finally, Chapter Ten of this thesis reflects on the research process and resultant findings, and their implications for biodiversity planning. This Chapter concludes with a set of recommendations to reinforce the opportunities, and surmount the barriers, for the implementation of plans for biodiversity in the wider English countryside. It also suggests areas for future research.

CHAPTER 2 BIODIVERSITY CONSERVATION

2.0 CHAPTER OUTLINE

This chapter will further expand on the approach adopted in England to biodiversity conservation, as briefly outlined in Chapter One. It will initially explore the historical, site-based approach to conservation, the establishment of the protected sites system and the scientific theory underlying its development. The chapter then reviews some of the increasingly important changing perceptions of the wider countryside, which are leading to a more holistic approach to biodiversity conservation. The final section examines some of the continuing declines in biodiversity, both within protected sites and the wider countryside.

2.1 SITE BASED CONSERVATION

2.1.1 Historical Approach to Biodiversity Conservation

The full importance of conserving biodiversity within the 'wider countryside' has only relatively recently been recognised. Most approaches to nature conservation have been based on the safeguard and management of key sites and, indeed, this practice still predominates. The weaknesses of policies based on isolated pockets of excellence have become only too apparent in the light of declining numbers of both rare and commonplace species, suggesting a need for a more inclusive approach to biodiversity conservation. However, in order to understand the significance of this thesis it is important to review the traditional site-based philosophy of conservation, which still dominates day-to-day practice.

The historical approach to nature conservation has been to protect individual sites of high conservation value. It is suggested that this attitude can be traced back to the preservation of private sporting interests, and to the initial growth of rural recreation in Victorian Britain (Gilg, 1996). As Adams (1993, p.185) states "the idea of setting aside pieces of land to foster or protect wild animals and plants is deeply rooted in British conservation".

The most influential report in terms of the future pattern of nature conservation was produced by the Huxley Committee in 1947 (Huxley, 1947). It "presented the basic

philosophy that the practice of nature conservation should centre around the safeguarding of a fairly large number of key areas" (Ratcliffe, 1977, p.1). The report proposed a Biological Service, a series of protected areas including national parks, local nature reserves and local educational reserves, conservation areas, geological monuments, National Nature Reserves (NNRs) and Sites of Special Scientific Interest (SSSIs) (Adams, 1986).

In 1949 the National Parks and Access to the Countryside Act led to the formation of the Nature Conservancy and the National Parks Commission. In terms of nature conservation, "the result was a nature or wildlife conservation body with relatively strong powers, a scientific approach and a set of duties that involved a strong site-based approach to the countryside" (Adams, 1993, p.187). However, the separate establishment of the Nature Conservancy and the National Parks Commission, under the 1949 Act, created the 'great divide' between nature and landscape conservation in Britain (MacEwen and MacEwen, 1982). Though both agencies adopted similar place-based strategies of land designation, their ethos and ways of working were notably different (Adams, 1993).

2.1.2 The Protected Sites System

As a result of the 1949 National Parks and Access to the Countryside Act, and subsequent legislation, a complex pattern of protected areas has developed in England over the past 50 years, as outlined in Table 2.1 (Bishop *et al.*, 1995). A protected site is defined as an area of land especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means (International Union for the Conservation of Nature, 1994)

Table 2.1 - System of protected sites within England

Level of protection			
International	**European**	**UK**	**Country**
• World Heritage Sites • Ramsar Sites • Biosphere Reserves	• Special Protection Areas • Special Areas of Conservation • Environmentally Sensitive Areas • Nitrate Sensitive Areas	• *National Nature Reserve* • Marine Nature Reserve • Local Nature Reserve • Forest Park • Forest Nature Reserve	• *Site of Special Scientific Interest* • Area of Special Protection • National Park • Area of Outstanding Natural Beauty • Heritage Coast

Source: Adapted from (Bishop *et al.*, 1995).

A key feature identified within this pattern of protected sites is the continued separation of nature and landscape conservation, as discussed earlier. The wider aim of the landscape designations, such as *National Parks*, *Areas of Outstanding Natural Beauty* and *Heritage Coasts*, is to protect their fundamental beauty, ecology and natural resources, while allowing them to continue to evolve to meet the needs of the people who live and work in them, and who visit them (Countryside Agency, 2001), whereas, the aim of the nature conservation sites, such as *National Nature Reserves* (NNR) and *Sites of Special Scientific Interest* (SSSI), is more specifically aimed at biodiversity conservation.

2.1.2.1 Sites for the Conservation of Biodiversity

According to English Nature (2000c) the protection of a coherent network of special sites, based around NNRs and SSSIs, is vital in their approach in helping to fulfil the UK's commitment to the conservation of biodiversity. NNRs were established to protect the most nationally important areas of wildlife habitat and geological formations in Britain, and as places for scientific research. They are either owned or controlled by English Nature or held by approved bodies such as Wildlife Trusts, and are carefully managed on behalf of the nation. As of 31st March 2000 there were 200 NNRs covering 80,533 hectares (English Nature, 2000a).

SSSIs are described by English Nature (1999) as the finest (NOTE – SSSIs not necessarily the best... intended to be a 'representative series', so may exclude high quality sites in some regions and include lesser sites in under-represented regions) sites for wildlife and natural features in England, supporting many characteristic, rare and endangered species, habitats and natural features. In contrast to NNRs, the majority of

SSSIs are privately owned. As supportive land use and active conservation management are vital to the well being of SSSIs, effective working partnerships have to be established with owners and land managers to maintain or restore the special features of interest. Adams (1993, pp.191-192) describes how the importance of SSSIs has increased with the passage of the Wildlife and Countryside Act 1981, which:

> ... shifted the focus of attention from the 'total conservation' of NNRs to the 'partial conservation' of sites which were identified but not owned, leased or held under Nature Reserve Agreement.

The World Wide Fund for Nature (World Wide Fund for Nature, 1997) perceives SSSIs as forming the backbone of the present system for protecting nature in England. As at 31 March 2000 there were 4,088 SSSIs covering 1,053,796 hectares (English Nature, 2000a).

The increasing number of protected areas established under European and international agreements, such as Special Protection Areas and Special Areas of Conservation, (known collectively as Natura 2000 sites) and Ramsar Sites at the international level, reflects the need to provide an additional level of protection to particularly important National level sites, rather than identifying additional sites.

2.1.3 Theory Behind Site Based Conservation

The science of designing and acquiring nature reserves to conserve biodiversity was greatly influenced by theoretical research from the 1960s, which began to explain the relationship between species viability and habitat size. The theory of island biogeography (MacArthur and Wilson, 1967), which attempted to explain the variations in species diversity on oceanic islands, was especially important. Simply stated, the theory holds that the number of species and the species composition of an island is dynamic, and is determined by the equilibrium between the immigration of new species and the extinction of those already present. According to the model, rates of immigration and extinction depend on the size of an island and its distance from a mainland species reservoir, and since the species appear to increase and decrease in an approximate logarithmic manner, a general equilibrium model can be constructed, as shown in Figure 2.1. Four equilibrium points are shown on the model representing different combinations of large and small islands near and far from continental shores.

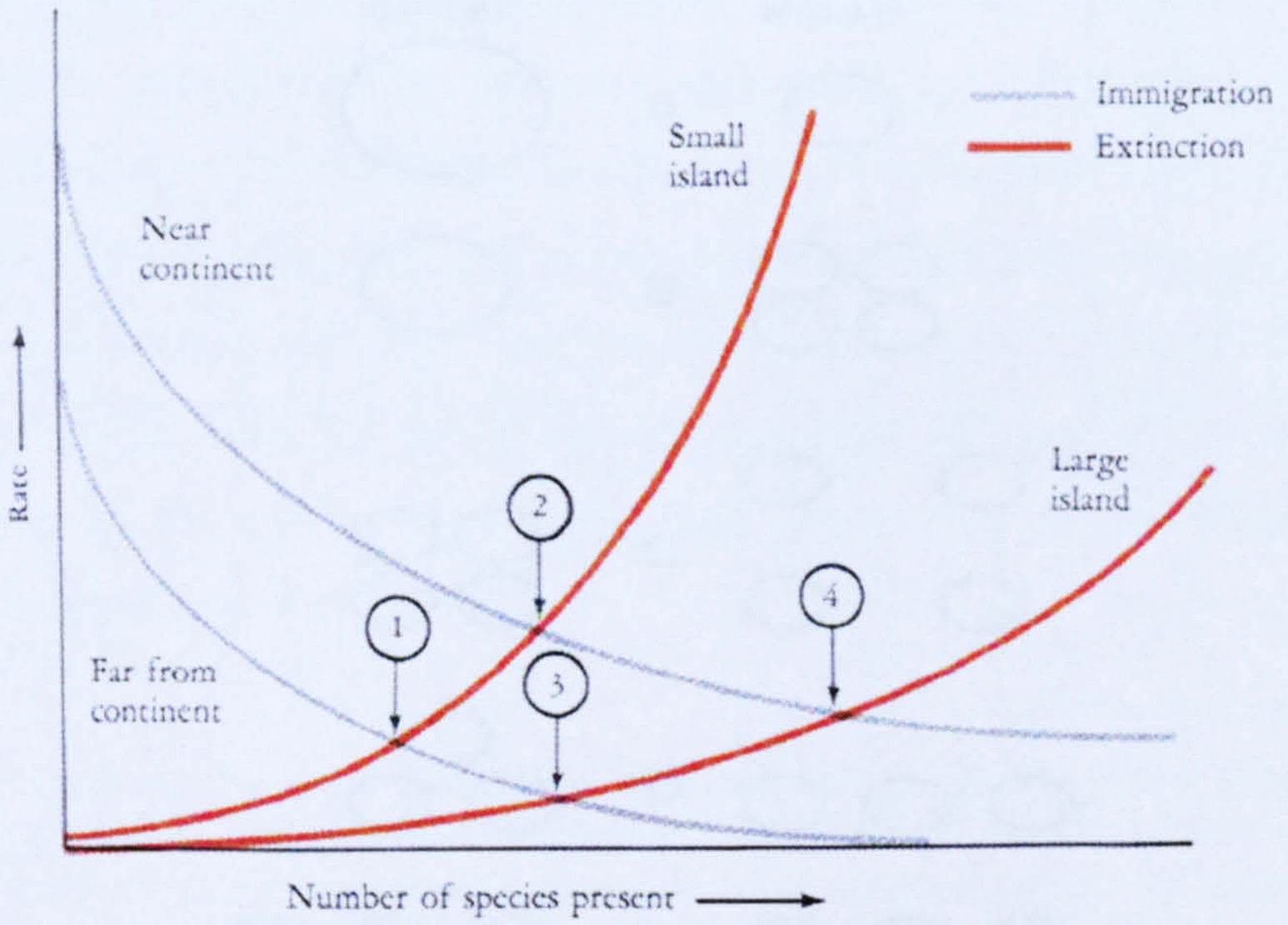


Figure 2.1 - Theory of Island Biogeography

Source: After (MacArthur and Wilson, 1967).

Owing to the continuing fragmentation and isolation of wildlife habitats, an analogy soon formed between the true 'oceanic islands', upon which the theory of island biogeography is based, and 'terrestrial habitat islands' which were surrounded by an apparent 'sea' of inhospitable domesticated or urbanised landscapes (Diamond, 1975). The theory of island biogeography enabled ecologists to relate island size to the range and viability of species through the production of species-area curves, which indicated that larger habitat islands would be likely to sustain a larger number of species.

The idea that such habitat islands could be treated by the same theories as real islands was initially very popular and led to several suggestions as to how such theories could aid conservation, culminating in proposals for designing and acquiring nature reserves. Selman (2000, p.161) describes how the theory of island biogeography was "highly influential on nature conservation policy, where it led scientists to debate the respective merits of protecting several small sites as opposed to a large single one within a particular area" (the SLOSS concept - 'single large or several small'). Diamond (1975) used the concept of island biogeography and species-area relationships to propose certain optimal design principles for nature reserves in order to maximise their species richness (Figure 2.2).

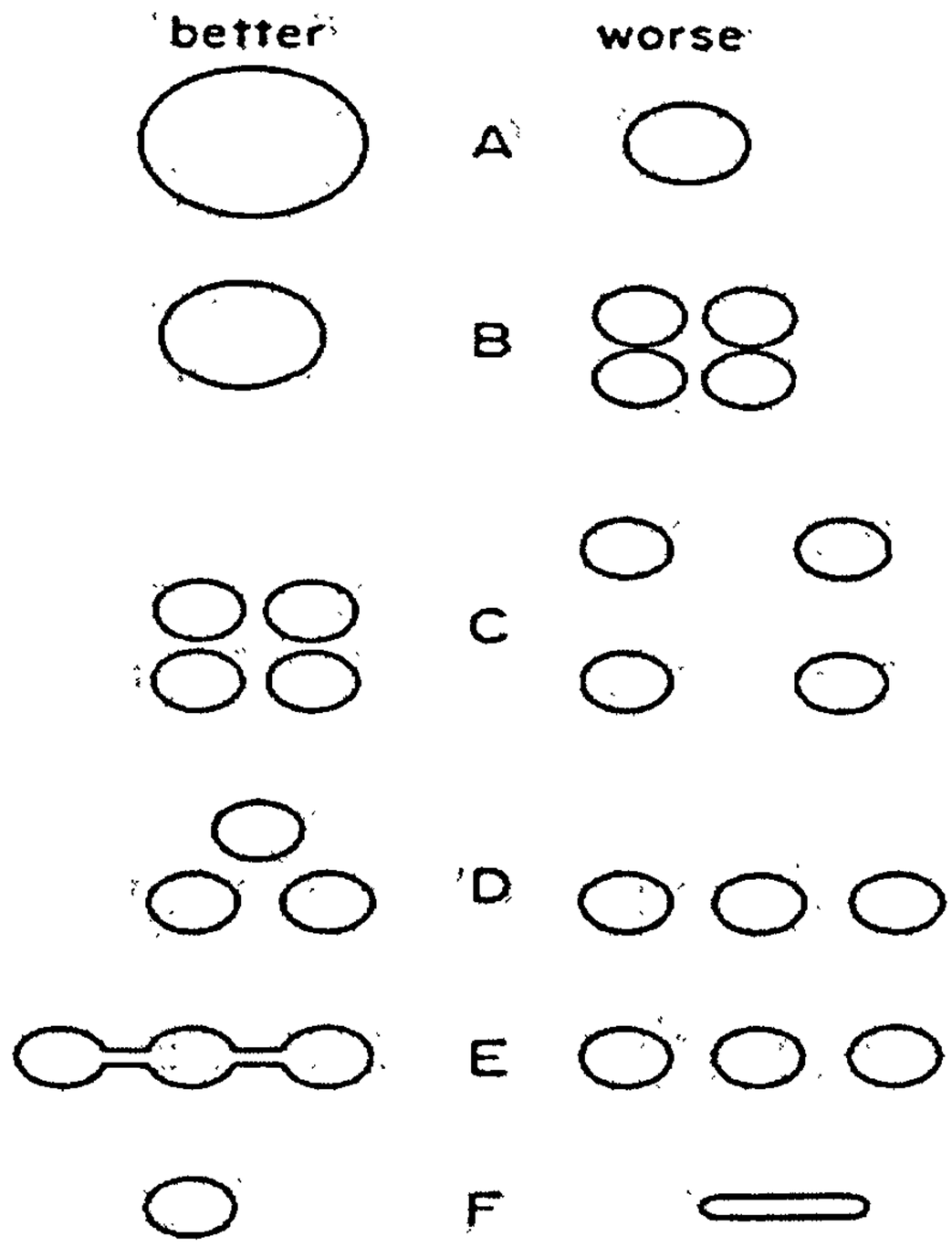


Figure 2.2 - Nature reserve design principles

Source: (Diamond, 1975).

The principles behind the six designs were:

A - A large reserve is better than a small reserve, as the large reserve can hold more species at equilibrium, and it will have lower extinction rates.

B - The reserve should generally be divided into as few disjunctive pieces as possible, for essentially the reasons underlying principle A.

C - If the reserve is broken up, the pieces should be as close to each other as possible, to increase immigration rates.

D - The reserve pieces should be grouped equidistant from each other, rather than grouped linearly, as in linear arrangement the terminal sites become isolated with reduced re-colonisation.

E - Connect several disjunct reserves with strips of protective habitats, which will increase the ability to disperse between reserves.

F - Reserves should be as nearly circular in shape as possible, to minimise dispersal distances within the reserve.

The application of island biogeography theory to terrestrial habitat islands is an appealingly simple idea, but the relationships between the population dynamics of species, and the qualities of core and intervening habitats, is far more complex. As a result, both the theory of island biogeography and its subsequent applications are often criticised for being too simplistic and not recognising the actual reality of designing and acquiring protected areas (Gilbert, 1980; Margules *et al.*, 1982; Reed, 1983). However, Peck (1998) points out that the principles proposed by Diamond (1975) were an important step in the development of the field, identifying several ideas that proved fundamental for reserve design:

> For example, large reserves are clearly valuable for most reserve systems. His principles regarding the size and shape of reserves addressed the impact of edges and the importance of maintaining interior habitat for sensitive species. By advocating reserves located close together, or connected by corridors, he highlighted the value of connectivity for species dispersal. (Peck, 1998, p.92)

2.1.4 Strengths and Weaknesses of Protected Sites

The importance of protected areas has been recognised in numerous international conferences and reports relating to the environment. For example, Bishop *et al.* (1995) describes the strengths of protected sites that were identified at the IVth World Congress of National Parks and Protected Areas in 1992, as detailed in Table 2.2.

Table 2.2 - Strengths and weaknesses of protected sites

Strengths:	Weaknesses:
• Safeguard places which are outstanding in terms of natural wealth, natural beauty and cultural significance • Maintain the life-supporting diversity of ecosystems, species, genetic variation and ecological processes • Protect species and the genetic variation that humans need, especially for food and medicine • Provide homes for human communities with traditional cultures and knowledge of nature • Protect landscapes reflecting a history of human interaction with the environment • Provide for the scientific, educational, recreational and spiritual needs of societies • Provide benefits to local and national economies and are models of sustainable development to be applied elsewhere	• The tendency to treat protected areas as 'islands' set apart from the areas around • The tendency to see protected areas as an alternative to, rather than one element within, a national strategy for conservation • The failure to integrate protected areas requirements into policies for the sectors (e.g. agriculture, tourism, transport) which affect them. • The inadequate recognition of the needs and interests of local people upon whose support the long-term survival of protected areas will depend • Limited public and institutional support for protected areas

Source: (Bishop *et al.*, 1995).

However, Bishop *et al.* (1995) claim that despite their many strengths, practical experience with protected areas has revealed numerous difficulties, some of which are 'external' and others 'internal'. The external weaknesses of protected sites, indicated in Table 2.2, derive from a failure to integrate protected areas into other areas of public policy, whereas the internal weaknesses, whilst closely linked to the external weaknesses, are concerned with the application of the protected sites concept. Both types of weakness "often occur in the form of 'symptoms' of the limited support given to protected areas, for example limited financial resources, gaps in scientific and other information, inadequate powers to manage the protected areas, and poorly trained staff, with limited skills" (Bishop *et al.*, 1995, p.293). Together, these external and internal factors undermine the effectiveness of protected areas in achieving their stated aims.

Despite these weaknesses and limitations, the protected sites system has been hugely beneficial in protecting key nature conservation sites. There is no doubt that far greater losses in biodiversity would have occurred had key sites and areas not been covered by these protective designations. Therefore, it can be concluded that protected areas are a necessary, but not sufficient, component of a biodiversity conservation system.

2.2 THE WIDER COUNTRYSIDE

It is now acknowledged that biodiversity conservation depends not just on designated sites but also on the areas of less intensively used land, within the wider countryside, which may have their own value as a wildlife resource or provide vital support for these protected areas. Adams (1994, p.147) claims "there is growing awareness that protected area systems are, on their own, inadequate measures to sustain the nature conservation value of the countryside"

2.2.1 Wildlife Resource

The protected system of SSSIs currently consists of 4,088 individual sites and covers an area of 1,053,796 hectares (English Nature, 2000a). Given that the total area of protected sites represents such a small area, currently only 6.8% of England's total area, many conservationists acknowledge that the wider countryside may hold over 90% of the national resources of biodiversity (Nature Conservancy Council, 1984). This point is alarmingly highlighted by Baldock *et al.* (1996, p.53) by claiming, "in the UK, a greater area is covered in roads than is included in SSSIs". The significant biodiversity potential of the wider countryside was also confirmed by Ratcliffe (1977, p.5) who emphasised "a need to conserve the much greater part of the national capital of wildlife and habitat which lies outside this relatively small" system of protected sites.

2.2.2 Support of Protected Sites

It also became apparent that, as the protected sites covered such a small area of the countryside, many plants and animals in nature reserves needed to be supported by populations outside protected areas to remain viable (Nature Conservancy Council, 1975). It is now widely recognised that declines in biodiversity are heavily dependent on what happens outside protected nature reserves. Adams *et al.* (1994) describe how the wider countryside can form a lattice of micro-habitats linking and enhancing the value of designated sites.

2.2.3 Importance of the Wider Countryside

In recognition of the importance of the wider countryside, the focus of conservation has started to shift away from the protection of individual sites, towards the management of the wider countryside. According to Adams *et al.* (1994, p.147) "the wider countryside

has become an increasingly important element within conservation policy over the last decade". It would appear that the issue of conservation in the wider countryside has risen considerably in importance during the period since this thesis was first started in 1997. Indeed, English Nature (2000a) has recently acknowledged the importance of the wider countryside, by stating that individual protected sites alone are not enough to sustain England's biodiversity:

> They cannot exist as isolated islands but need to be joined up as part of the wider network of wildlife corridors and habitat that we call 'lifescape'. This is landscape level conservation that is good for wildlife, economy and communities. (English Nature, 2000a, p.1)

This new approach at landscape level conservation marks a significant shift from the more traditional sites-based approach. It also suggests a need to further reduce the 'great divide' between nature and landscape conservation, as discussed in Section 2.1.1. As Adams (1993, p.200) suggests:

> The potential for common ground between landscape and nature conservation is considerable. The appearance of landscape cannot effectively be separated from the status of the semi-natural habitats within it. Neither can the conservation of species within preserved sites be divorced from the wider countryside matrix within which they lie.

2.3 DECLINES IN BIODIVERSITY

Despite considerable conservation effort there have been continued declines in biodiversity, both within protected sites and the wider countryside. The cause of these declines is often associated with agriculture, forestry, development and recreation (English Nature, 1999). For much of the past, agricultural activities, and other forms of rural production, have produced complex and diverse habitats and landscapes; however, since the Second World War their influence has had a profoundly net negative effect (Sheail, 1995). Adams (1996a) regards the advance of agriculture to be the main human influence on British wildlife.

2.3.1 Site Based Declines

Just as there were significant losses of semi-natural habitats in the wider countryside in the post-war period, many protected sites were lost or damaged often as a result of agricultural activities. Adams (1993, p.196) claims that "neither the intensity of interest

by conservationists outside of the Nature Conservancy Council, nor the scale of effort invested within it, have been sufficient to stop SSSI loss and damage". For example, in the six counties of the Nature Conservancy Council south-east region, almost two-thirds of SSSIs had been subject to potentially damaging operations since first scheduling (Barton and Buckley, 1983). Adams (1993) identified 1539 cases of damage to SSSIs, between 1984 and 1990, which represents damage to just over one site in four.

The most recent review of the overall condition of the SSSI system, based on 1,883 SSSIs assessed during 1999/2000, revealed that nearly 57% of the SSSI area were in an unfavourable condition, although 15% of this total was described as recovering, as illustrated in Figure 2.3 (English Nature, 2000c). It is difficult to ascertain long-term trends, however, as monitoring figures are rarely comparable from year to year (World Wide Fund for Nature, 1997).

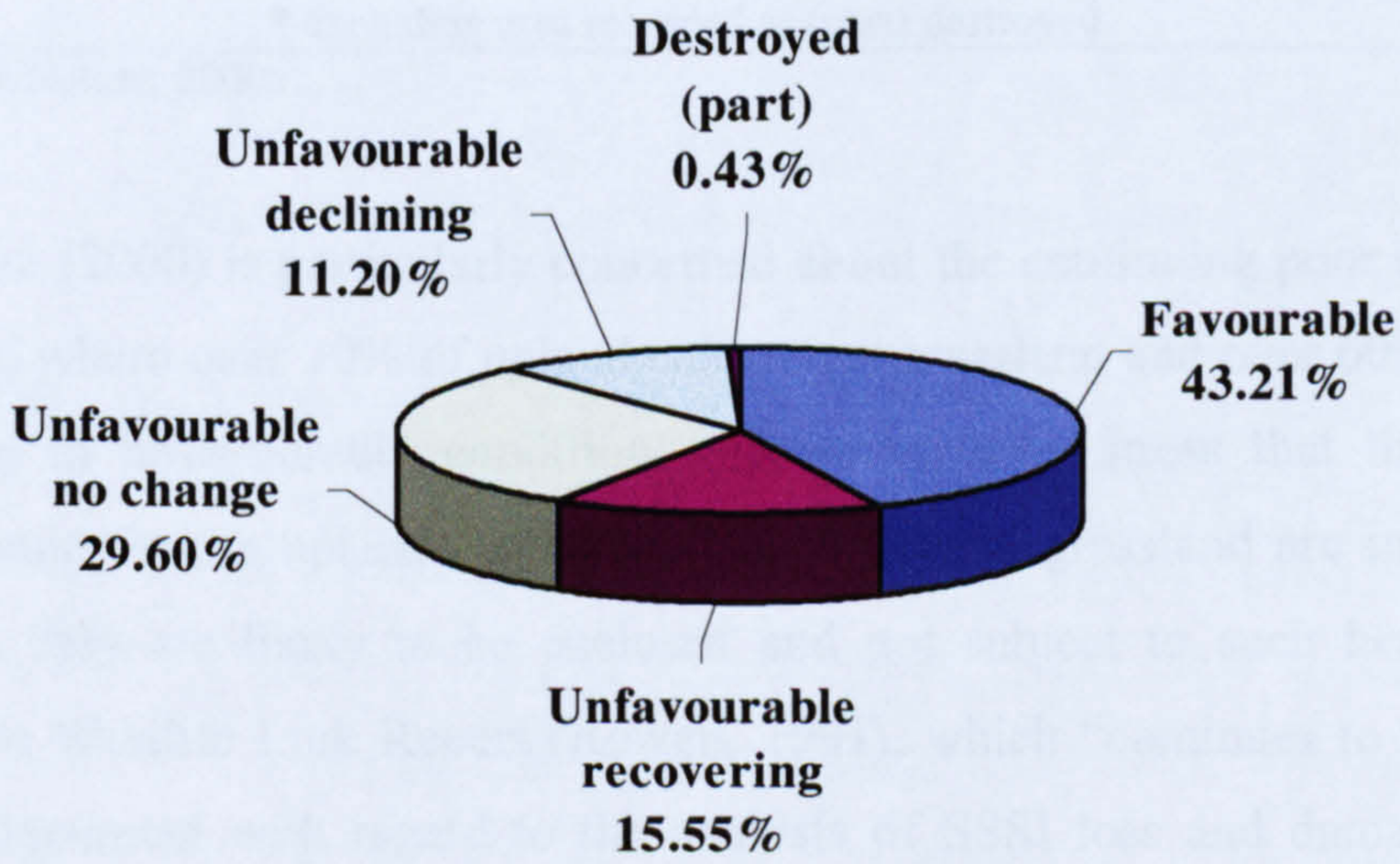


Figure 2.3 - Condition of SSSIs by area at 31 March 2000

Source: (English Nature, 2000c).

In an attempt to improve the data on SSSIs, English Nature (2000c) is now aiming to provide information on the condition of broad habitat types within SSSIs, whereas information in the past has been based purely upon number. As Adams (Adams, 1993, p.197) identified, it has been "extremely difficult to collect adequate data on damage to biological SSSIs". To date, simple habitat information on about one-third of the area of SSSIs has been collected. The first estimate of the condition of habitat on SSSIs, derived from a 33% sample, is given in Table 2.3.

Table 2.3 - Condition of habitat types within Sites of Special Scientific Interest

Broad habitat types	% of area* in favourable or unfavourable recovering condition	% of area* in unfavourable, no change or declining condition
Lowland woodland	79	21
Upland woodland	70	30
Lowland neutral grassland	***77***	***23***
Upland neutral grassland	78	22
Lowland calcareous grassland	76	24
Upland calcareous grassland	***26***	***74***
Lowland acid grassland	71	29
Upland acid grassland	38	62
Lowland heathland	75	25
Upland heathland	***37***	***63***
Fen, marsh and swamp	65	35
Bogs	34	66
Standing water and canals	68	32
Rivers and streams	35	65
Supralittoral rock	83	17
Supralittoral sediment	75	25
Intertidal mud/rock	82	18
Saltmarsh	66	34

* excluding area recorded as (part) destroyed

Source: (English Nature, 2000c).

English Nature (2000) is particularly concerned about the continuing poor condition of upland SSSIs, where over 70% of upland calcareous grassland and over 60% of upland heathland are in unfavourable condition. However, they stress that this is not a consistent picture in the uplands, as over 75% of neutral grassland are in favourable condition, as they are likely to be enclosed and not subject to such heavy grazing pressure. The Wildlife Link Report (Rowell, 1991), which "continues to be the most informative document with regard to the analysis of SSSI loss and damage" (World Wide Fund for Nature, 1997, p.13), concluded that SSSIs have failed to safeguard Britain's wildlife sites adequately and that damage was taking place at disturbing levels.

2.3.2 Wider Countryside Declines

A review of the key indicators of biodiversity as introduced in Section 1.3.3.1, namely populations of wild birds, trends in plant diversity and landscape features, provides a topically important overview of changes in biodiversity in the wider countryside. For instance, the attrition of biodiversity is clearly evident from the decline in the populations of wild birds, as illustrated in Figure 2.4, which are considered to be a good indicator of the broad state of wildlife and the countryside (Department of the

Environment, Transport and the Regions, 1998). The index has been constructed by adding together data for 139 species of more common breeding birds native to the UK.

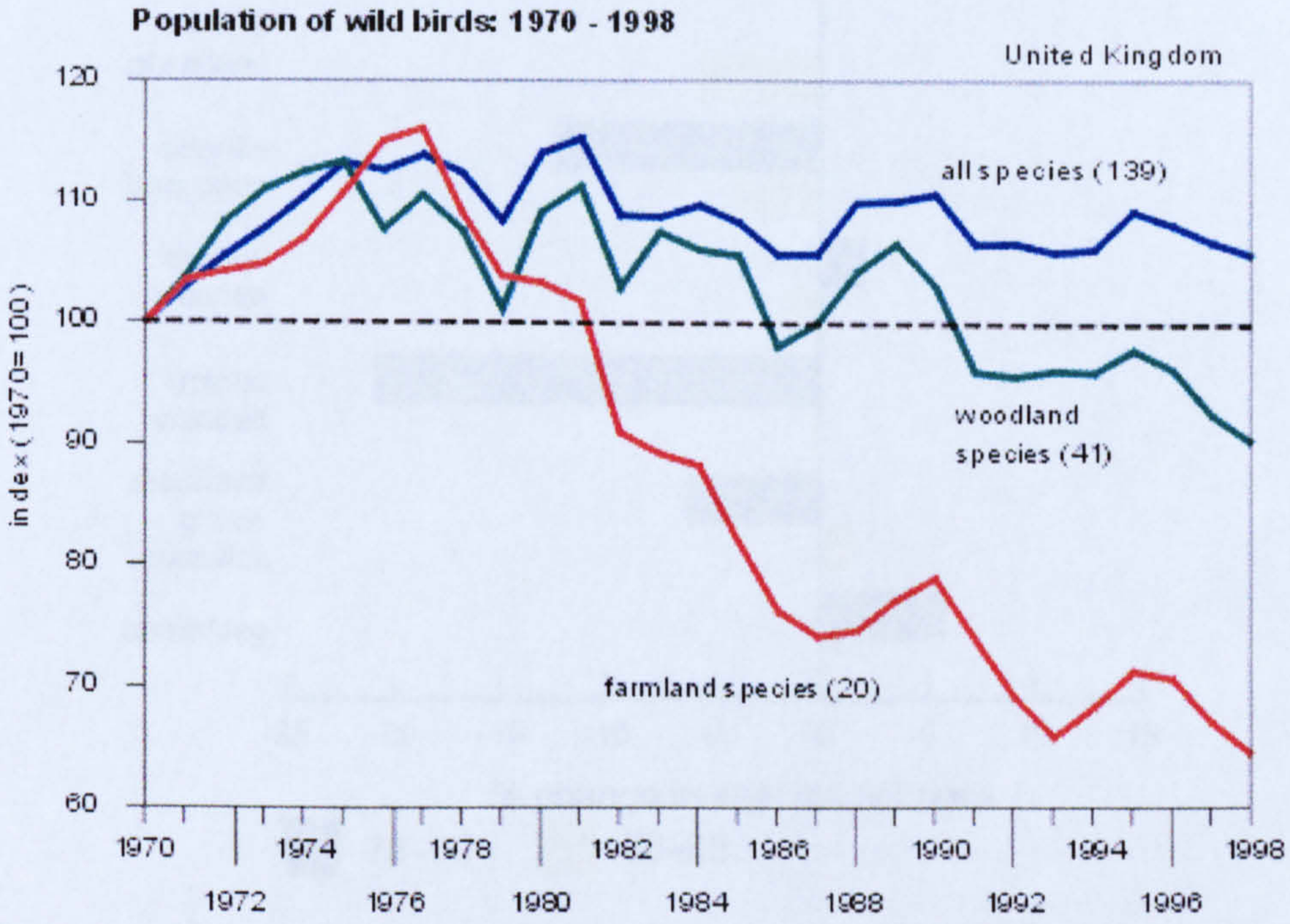


Figure 2.4 - Declines in wild bird populations

Source: (Department of the Environment, Transport and the Regions, 1998).

Within the bird index the populations of nearly half of all species have increased by over 10% since 1970, though many of these species were birds of open water. However, the decline in farmland bird species is particularly clear, with 13 of the 20 farmland birds declining by more than 10%, whereas, only 17 of the 41 woodland bird species are experiencing a similar decline.

The results of the recent Countryside Survey 2000 (Haines-Young *et al.*, 2000) updates the two indicators, plant diversity and landscape features, as mentioned above. It is suggested that species richness is an easily understood concept and is a direct assessment of plant diversity in the countryside, which can be correlated with other wider groups of species. The species-richness indicator is based on the analysis of eight major vegetation types, as detailed in Figure 2.5.

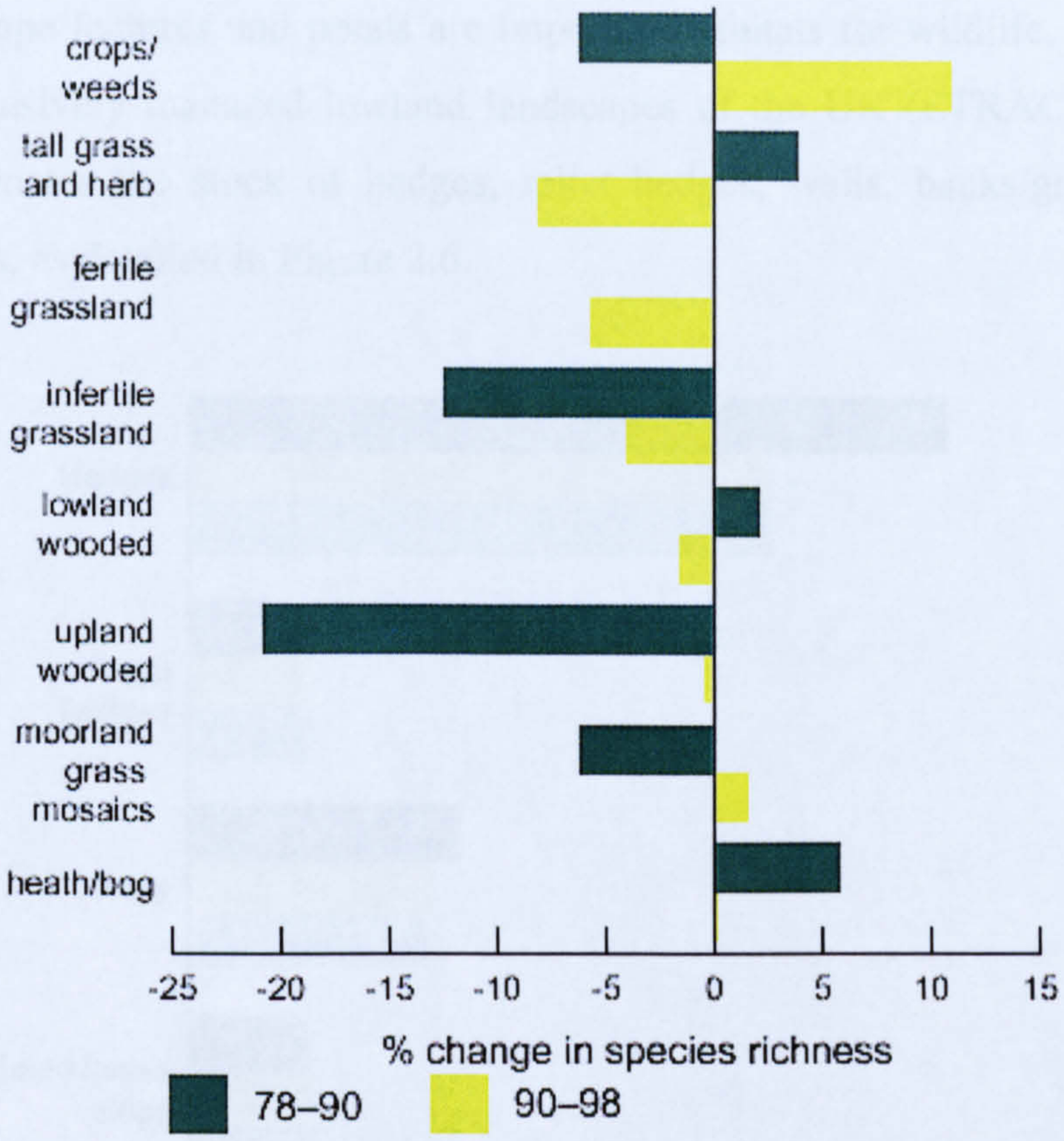


Figure 2.5 - Percentage change in species richness in the major vegetation types in Great Britain for two periods, 1978-90 and 1990-98

Source: (Haines-Young *et al.*, 2000).

In the period 1978-1990 there were clearly significant declines in species richness recorded in infertile grassland, upland woodland and moorland grass vegetation types. A detrimental increase was recorded in the characteristically species poor, heath and bog vegetation. According to Firbank *et al.* (2000) these changes were thought to be associated with agricultural intensification, management of field boundaries, afforestation and atmospheric pollution, and are considered to represent a decline in ecological condition. The results for the 1990-98 period illustrate that many of the deleterious changes in species richness have reduced in magnitude or have halted. Declines in species richness in the 1990s are mostly associated with the vegetation found in managed agricultural grasslands, field boundaries and verges. According to Haines-Young *et al.* (2000, p.2) "the continued decline in the diversity of our least agriculturally improved grasslands is a matter of concern". There have also been marked trends in the condition of vegetation indicating increasing eutrophication, with conditions favouring tall, competitive plants.

Linear landscape features and ponds are important habitats for wildlife, particularly in the more intensively managed lowland landscapes of the UK (ETRAC, 1998). This indicator estimates the stock of hedges, relict hedges, walls, banks/grass strips and lowland ponds, as detailed in Figure 2.6.

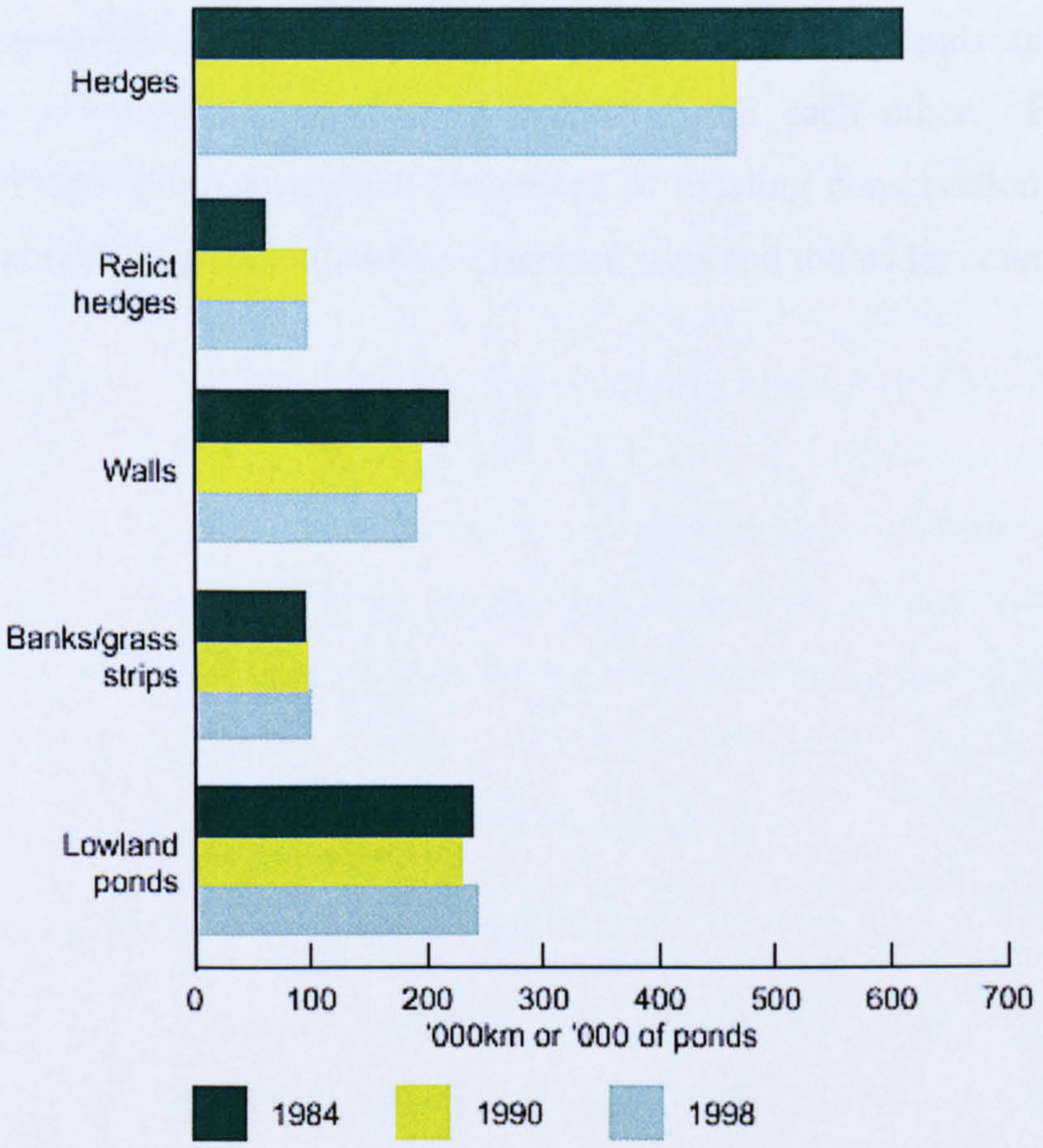


Figure 2.6 - Estimated stock ('000 km) of linear features and number of lowland ponds ('000) in 1984, 1990 and 1998 in Great Britain

Source: (Haines-Young *et al.*, 2000).

The results show that there has been generally little change in the total length of these landscape features since 1990. This situation contrasts markedly with the period between 1984 and 1990, when it is estimated that 23% of hedges and 10% of walls were lost due to removal or lack of appropriate management (Haines-Young *et al.*, 2000). These results may be regarded as an important measure of the success of policies introduced during the 1990s which aimed to encourage hedgerow management, planting and protection.

2.4 ISSUES RAISED

This chapter has explored how the site-based philosophy, derived from the over simplified application of island biogeography theory, remains at the root of British conservation. There is an emerging shift from this traditional site-based approach, to a more holistic view of conservation in the wider countryside. This shift is coupled with a growing recognition of the important connection between landscape and nature conservation, previously approached in isolation from each other. However, this chapter concluded by reviewing the limitations of existing conservation strategies by detailing biodiversity losses both within protected sites and the wider countryside.

CHAPTER 3 LANDSCAPE ECOLOGY AND THE WIDER COUNTRYSIDE

3.0 CHAPTER OUTLINE

The role of this chapter is to explain some of the scientific theories underlying the importance of the wider countryside. An important, emerging basis for understanding the nature and dynamics of the wider countryside is now provided by landscape ecology. This appears to be able to help us explain, predict and plan change in the wider countryside, focussed as it is on patterns and process within entire landscapes, rather than just on protected sites. A greater understanding of the general principles, which appear to be applicable to the wider countryside, will allow the identification of key landscape ecological features for retention, thus providing a defensible basis for subsequent biodiversity plans. This chapter concludes with examples of biodiversity planning based upon landscape ecological principles, illustrating their wider acceptance in the conservation community.

3.1 DEVELOPMENT OF LANDSCAPE ECOLOGY

Landscape ecology is defined as "the study of the interactions between the temporal and spatial aspects of a landscape and its flora, fauna and cultural components" (Dover and Bunce, 1998, p.xx). According to Farina (1998) the term landscape ecology was first coined by the German biogeographer Carl Troll at the end of the 1930s. Troll hoped that a new science could be developed that would combine the spatial, 'horizontal' approach of geographers with the functional, 'vertical' approach of ecologists.

The landscape perspective is considered to have great potential for the integration of different sciences. Farina (1998) describes how the scale of the landscape comprises a complete set of socio-economic and ecological processes, all of which combine to form the real world. As a result landscape ecology, one of the youngest branches of ecology, is regarded as occupying an important bridge between pure and applied ecology.

3.2 THE LANDSCAPE ECOLOGICAL NETWORK

In terms of biodiversity conservation, landscape ecology is based around the principle of the countryside containing an ecological infrastructure or network that is conducive to different levels of species diversity. Rather than limiting the focus to isolated terrestrial 'islands', as suggested by island biogeography, landscape ecology provides a means of focussing upon the importance of the surrounding 'sea' of the wider countryside.

3.2.1 Metapopulation Models

A primary development underlying modern landscape ecology is the metapopulation model, which has important conceptual links with the theory of island biogeography, as described in Section 2.1.3. According to Hanski and Gilpin (1991, p.3) "metapopulation ideas play an increasingly important role in landscape ecology and conservation biology". Levins (1970) first used the term 'metapopulation' to describe a population of populations of conspecific individuals. Instead of focussing on a population, Levins (1970) considered a set of sub-populations actively in contact with each other. This approach focused upon the population dynamics of key species and departs from traditional ecology (which focuses on the life-cycle (birth-immigration-death-extinction) processes of individual populations) by stressing the importance of interactions between individual populations across the wider countryside, as illustrated by the example in Figure 3.1. The circles represent distinct habitat patches, the butterflies symbolise discrete populations of conspecific individuals, whilst the arrows illustrate the interactions between these subpopulations across the wider countryside.

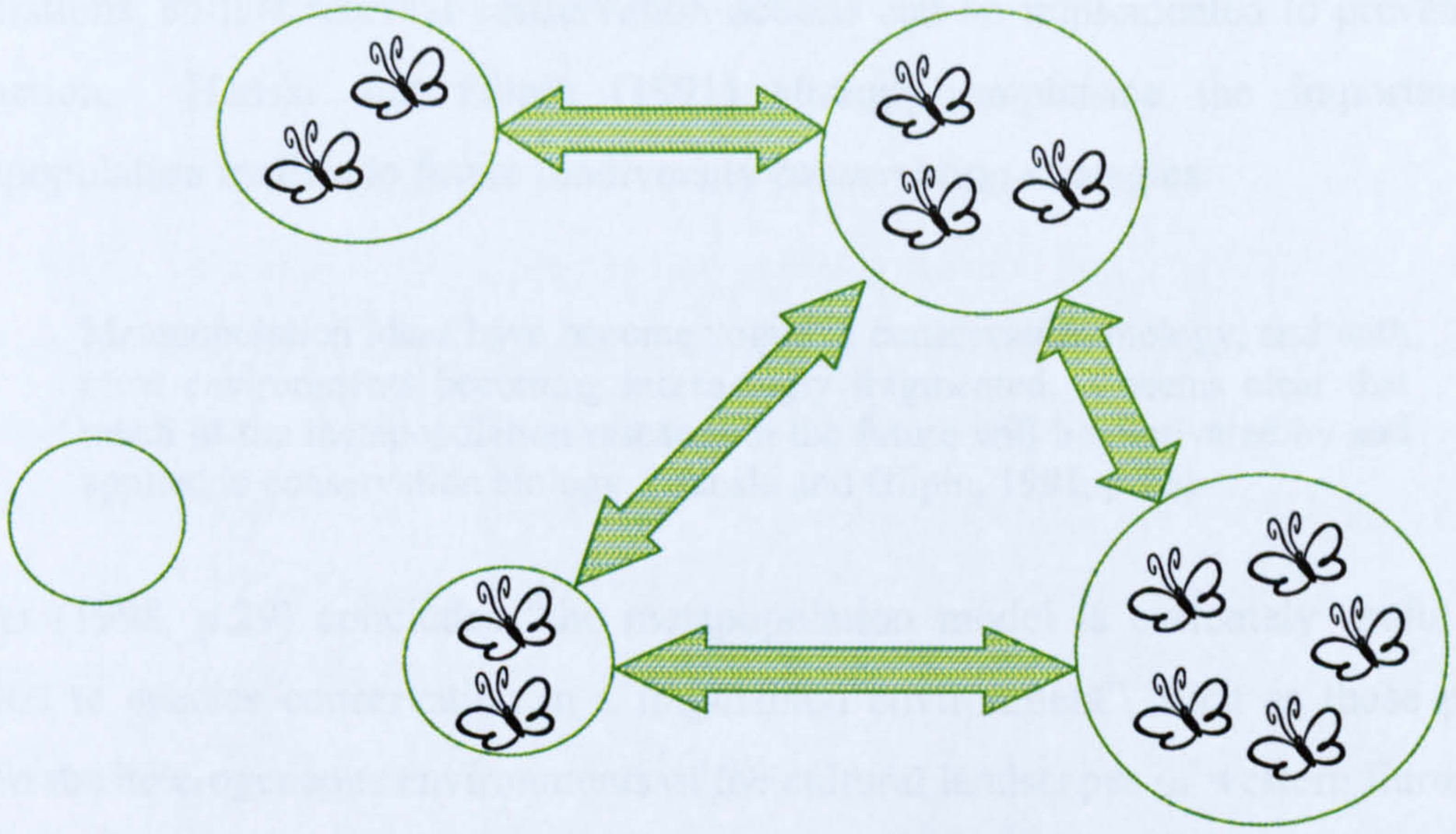


Figure 3.1 - Example of a metapopulation model with several connected subpopulations interacting across the wider countryside

Farina (1998) describes metapopulations as systems in which the rate of extinction and re-colonisation creates a flux of individuals that ensures genetic connectivity between the sub-populations. In this model, local populations of organisms undergo periodic colonisation and extinction, while the metapopulation as a whole persists indefinitely. The metapopulation concept assumes that essential life-cycle processes operate between these sub-populations, and the risk of local extinction and the probability of re-colonisation mainly depend on the ability to maintain an exchange of individuals. When populations living in a heterogeneous environment become isolated by hostile or less favourable conditions, contact between them is ensured only by emigration or immigration. The factors driving these processes may include the search for food, competition for space and resources, breeding and even climatic change.

The historical trend towards conserving discrete patches of conservation interest, as described in 2.1.1, has created a series of small and often isolated habitat islands. As a result, many species with a formerly continuous distribution are being turned into possible metapopulations by habitat fragmentation. The subsequent isolation of these fragmented populations increases the probability of local extinction as the exchange of individuals is reduced. In light of this concern, Keith Porter of English Nature (1999, pers. comm.) described how we should no longer look at protected sites as wildlife sinks but as sources to recolonise the wider countryside. Metapopulation models are becoming increasingly important in understanding the dynamics of such fragmented

populations, so that relevant conservation actions can be implemented to prevent total extinction. Hanski and Gilpin (1991) strongly emphasise the importance of metapopulation models to future biodiversity conservation strategies:

> Metapopulation ideas have become vogue in conservation biology, and with most environments becoming increasingly fragmented, it seems clear that much of the metapopulation research in the future will be motivated by and applied to conservation biology. (Hanski and Gilpin, 1991, p.13)

Farina (1998, p.29) concludes "the metapopulation model is extremely useful when applied to species conservation in a fragmented environment", such as those present within the heterogeneous environments of the cultural landscapes of western Europe.

3.2.1.1 Genetic Level Conservation

Currently there is much concern not only about loss of *species* diversity, but also about loss of *genetic* diversity due to human activities, which is now reaching public and political levels (Wilson, 1994). As previously stated in Section1.2.2, all levels of biodiversity are necessary for the continued survival of species and natural communities, and all are important for the well-being of humans. However:

> Current actions in Britain have tended to focus on 'species' (and only a restricted range of these) as units of conservation. The importance of preserving biological diversity at the 'genetic' level has been neglected... This has potentially damaged a heritage of richly textured local geographic variation. (Baldock *et al.*, 1996, pp.1-2)

It would appear that landscape ecological theories, and the metapopulation model in particular, provide an essential means of refocusing conservation efforts in securing the longer-term benefits of genetic diversity, in contrast to the prevalent short-term approach based upon the conservation of species. According to the metapopulation model, the genetic viability of apparently isolated and vulnerable populations may in turn be sustained if they are able to interconnect with other members of their species across a relatively hospitable countryside. Where populations become too isolated, genetic drift may occur, in which the genetic diversity within a population starts to decline, so that the species locally becomes less resilient and adaptable to environmental change, thereby accelerating the likelihood of local extinction.

3.2.2 Components, Patterns and Processes in the Landscape Network

Although the components of biodiversity, such as particular habitats and species, are often the focus of conservation action, these components cannot exist in isolation as they are all connected within the wider network of the countryside. To conserve biodiversity effectively there is a fundamental need to address not only the components of biodiversity, but also the relationships that occur among them. In recognition, Peck (1998) adds *patterns* and *processes* to the components of biodiversity to form the foundation of a biodiversity framework, in order to promote a more comprehensive approach to the planning and management of biodiversity. The biodiversity framework (Figure 3.2), which is strongly influenced by the emerging theories of landscape ecology, consists of the components, patterns and processes of biodiversity, each existing at multiple levels of organisation and all varying over time.

> By incorporating all three attributes (components, patterns and processes), not only can specific variations in the biota be considered, but so can many other factors on which this diversity depends. Similarly, addressing different levels of organisation ensures that a range of these attributes is included. (Peck, 1998, pp.7-8)

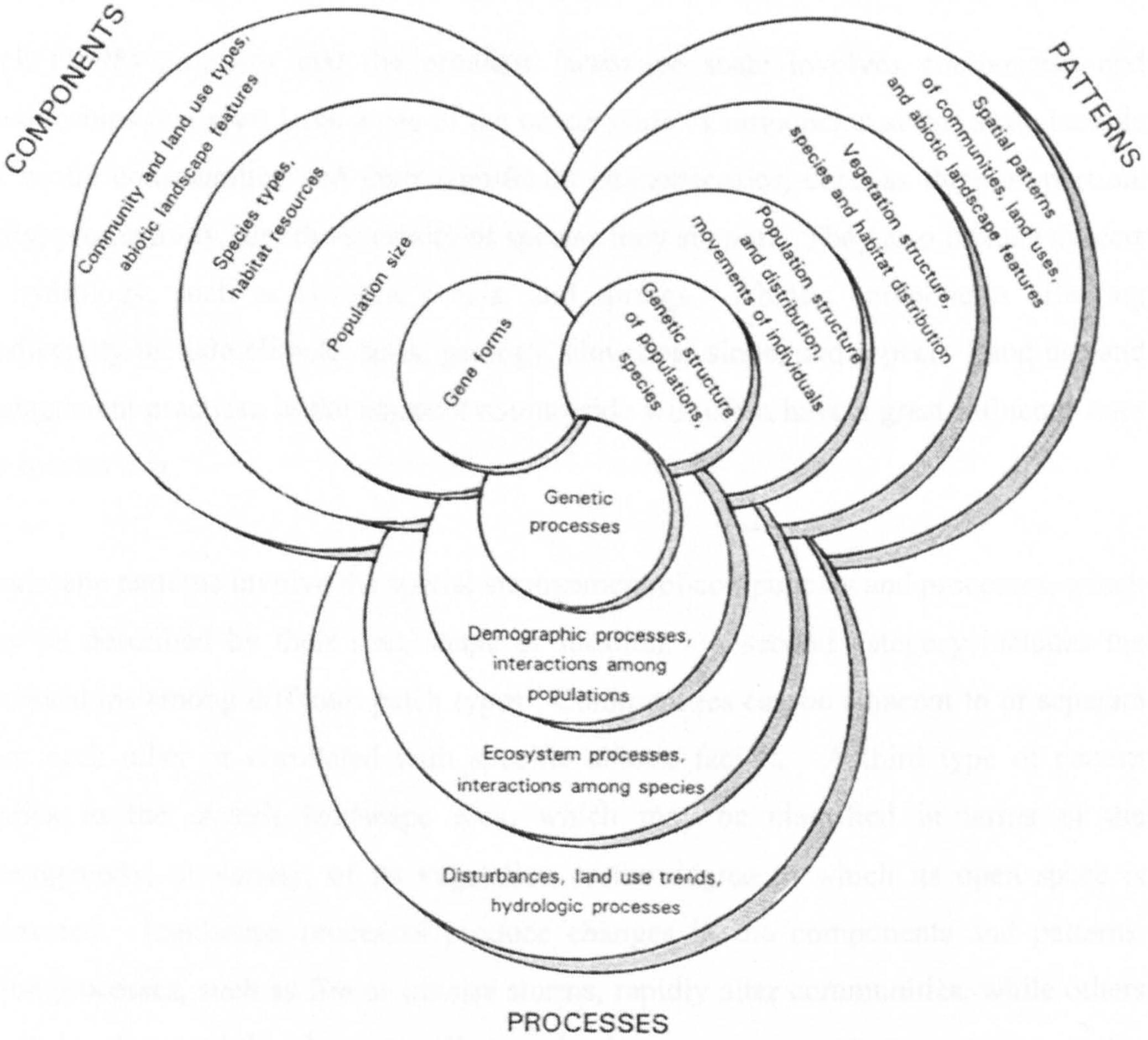


Figure 3.2 - Biodiversity conservation framework, incorporating components, patterns and processes of biodiversity operating at various scales

Source: (Peck, 1998).

3.2.2.1 The Importance of Scale

This framework suggested by Peck (1998) also highlights the importance of *scale*, as different levels of organisation are inherent in any landscape, and each has characteristic components, patterns and processes. It is hoped that "this further organisation will help planners identify more aspects of biodiversity and then focus on those particularly relevant to their situation" (Peck, 1998, p.11). Peck regards *populations* and *communities* to be very useful scales, since they are the basic biological units in parks and open space, whilst the broadest *landscape* tier, which comprises various communities, can exhibit numerous patterns and processes essential to biodiversity. It is also considered useful to define a finer *genetic* level, as this includes a distinct set of ecosystem attributes.

Peck (1998) proposes that the broadest landscape scale involves components and relationships that span large areas of the countryside. Components at this scale include the biotic communities and their significant characteristics, such as their proportion, rarity, productivity, and the diversity of species they support. They also include aspects of hydrology, such as streams, ponds, and springs. Abiotic components affecting biodiversity include climate, soils, geology, elevation, slope, and aspect. Land use and management practices in the adjacent countryside will often have a great influence over the species mix.

Landscape patterns involve the spatial arrangement of components and processes, which may be described by their size, shape or location. A second category includes the relationships among different patch types. Communities can be adjacent to or separate from each other or correlated with specific abiotic factors. A third type of pattern applies to the overall landscape area, which may be classified in terms of the heterogeneity, or variety, of its vegetation or the degree to which its open space is connected. Landscape processes produce changes in the components and patterns. Some processes, such as fire or intense storms, rapidly alter communities, while others result in slow, subtle changes. Human land uses are important processes at the landscape scale.

According to Peck (1998) the finer community scale can also be associated with specific components, patterns and processes. Here, the components include species and key habitat resources, often species that are endangered, rare, limited in distribution, ecologically valuable, or exotic are of particular interest. Community patterns include characteristics of vegetation structure as well as the distribution of resources. Among the processes operating at this scale are those specifically associated with a vegetation type, such as succession, and those occurring between communities. "When a particular species is the target, a plan might address community processes such as herbivory, predation, or parasitism" (Peck, 1998, p.14).

At the *population* scale the components are associated with individual populations, whilst the patterns relate to the number of populations, the distance between them, migration patterns and population structures. Processes at this scale would include reproduction, mortality, movement abilities, immigration, emigration and the

subsequent interbreeding among populations. At the finest *genetic* scale the components would comprise the variety of gene forms. The genetic patterns would focus upon the variety within, and among, an individual population, which is in turn affected by processes operating at the genetic level, such as interbreeding and inbreeding, which regulates the rate of genetic change.

By subdividing ecological components, patterns, and processes according to biological scales, one can gain a better understanding of a range of aspects of biodiversity. This approach also helps identify attributes from different scales that might influence a specific concern. For example, Peck (1998) describes how a planner, attempting to conserve a rare community, might consider attributes at the landscape and population levels as well as the community scale. At the landscape level, abiotic factors constrain where vegetation grows, land-use pressures affect the rate at which it is developed, large-scale disturbances influence species diversity, and vegetation patterns govern the movements of community animals. At the population level, characteristics of regeneration, demographics, and movement affect the species and processes of the community. In general, diversity at any given level will be constrained by attributes associated with the level above and will exhibit properties that can be explained in part by the level below (Urban *et al.*, 1987). Because of these interactions, it is useful to consider and plan for biodiversity at multiple scales.

3.3 KEY ECOLOGICAL FEATURES OF THE WIDER COUNTRYSIDE

Many authors (e.g. Forman and Godron, 1986; Forman, 1995; Dramstad *et al.*, 1996; McIntyre and Hobbs, 1998; Peck, 1998) have attempted to distil the key principles of landscape ecology, especially those directly usable in land-use planning and to illustrate how these principles can be used in practice. An understanding of the components, patterns and processes within the wider countryside, as outlined above, has allowed the identification of key landscape ecological features that need to be retained in order to conserve biodiversity. These key features will subsequently provide a basis for future biodiversity planning.

Commonly, the principles of landscape ecology revolve around four distinct features of the countryside, which, according to the previous authors, consist of: *core habitat*

patches; *buffer zones* around these areas; *connections* between them; and the wider landscape *matrix* surrounding these areas, as illustrated in Figure 3.3.

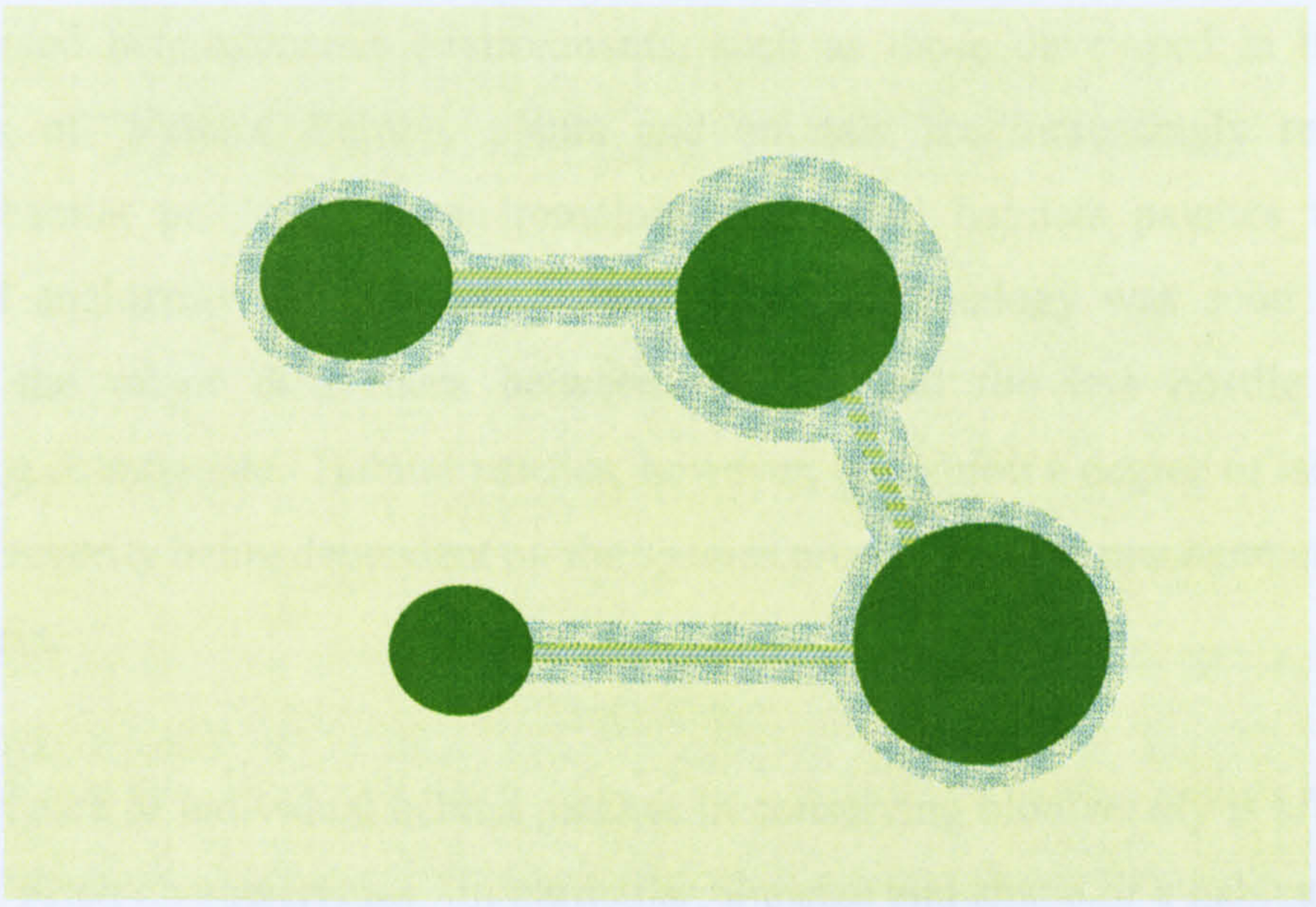


Figure 3.3 - The key ecological features of the landscape

These four broad landscape ecological features are based upon current theoretical developments within landscape ecology, and represent distinct elements within the wider countryside. Collectively these individual features, and their associated pattern, combine to form the landscape ecological network, which underpins the various processes affecting biodiversity. However, it is acknowledged that biodiversity knowledge is currently lacking, and at best these proposed systems, based upon the conservation of key ecological features, could be viewed as experiments. They are clearly valuable for conservation, but it is not always certain that they will meet their specific goals. For example:

> Since one can only estimate minimum populations, it is not possible to be sure how large a reserve should be to maintain a particular species. Also, relatively little is known about which animals might actually use a designated corridor. Therefore, it is prudent to err on the conservative side, that is, to leave more than the absolute minimum amount of space, or more than the minimum number of corridors. (Peck, 1998, pp.7-8)

It is also considered important to monitor these systems, and to be flexible enough to adapt them when they do not function as expected.

3.3.1 Habitat Patches and Fragments

In fragmented heterogeneous environments, such as those developed in the cultural landscapes of Western Europe, plants and animals are increasingly restricted to scattered habitat patches. These remaining terrestrial habitats patches were often considered analogous with oceanic 'islands', but this analogy was soon abandoned owing to the major differences between the sea and the less hostile matrix of surrounding countryside. Habitat patches, however, do exhibit a degree of isolation, the effect and severity being dependent on the species present and the management intensity of the matrix.

The importance of individual habitat patches in conserving biodiversity is affected by a number of patch characteristics. In particular, the size and shape of a habitat patch will significantly influence the prospects of the species present. The importance of size is related to the species-area relationship, which is a formalisation of the observation that large areas usually contain more species than small areas of comparable habitat (Rafe, 1983; Watts, 1996). According to many authors (e.g. Forman and Godron, 1986; Dramstad *et al.*, 1996; Farina, 1998) patch size is fundamental to preserving viable populations. In particular, it is the area of individual habitat types in relation to the spatial requirements of specific species that is of concern.

In terms of shape, irregular shaped habitat fragments, with a large perimeter-area ratio, may disfavour species by creating a disproportionate length of 'edge', where changes in light, moisture, temperature and wind are most pronounced. The subsequent modification in edge conditions may significantly alter the plant and animal communities that occur there (Collinge, 1996). Elongated patches of habitat may be entirely influenced by edge effects, whereas circular patches, with a relatively low perimeter-area ratio, will reduce the likelihood of species becoming vulnerable to edge effects by creating 'interior' conditions that maximise the preferences of sensitive species and minimise their likelihood of disturbance, as illustrated in Figure 3.4.

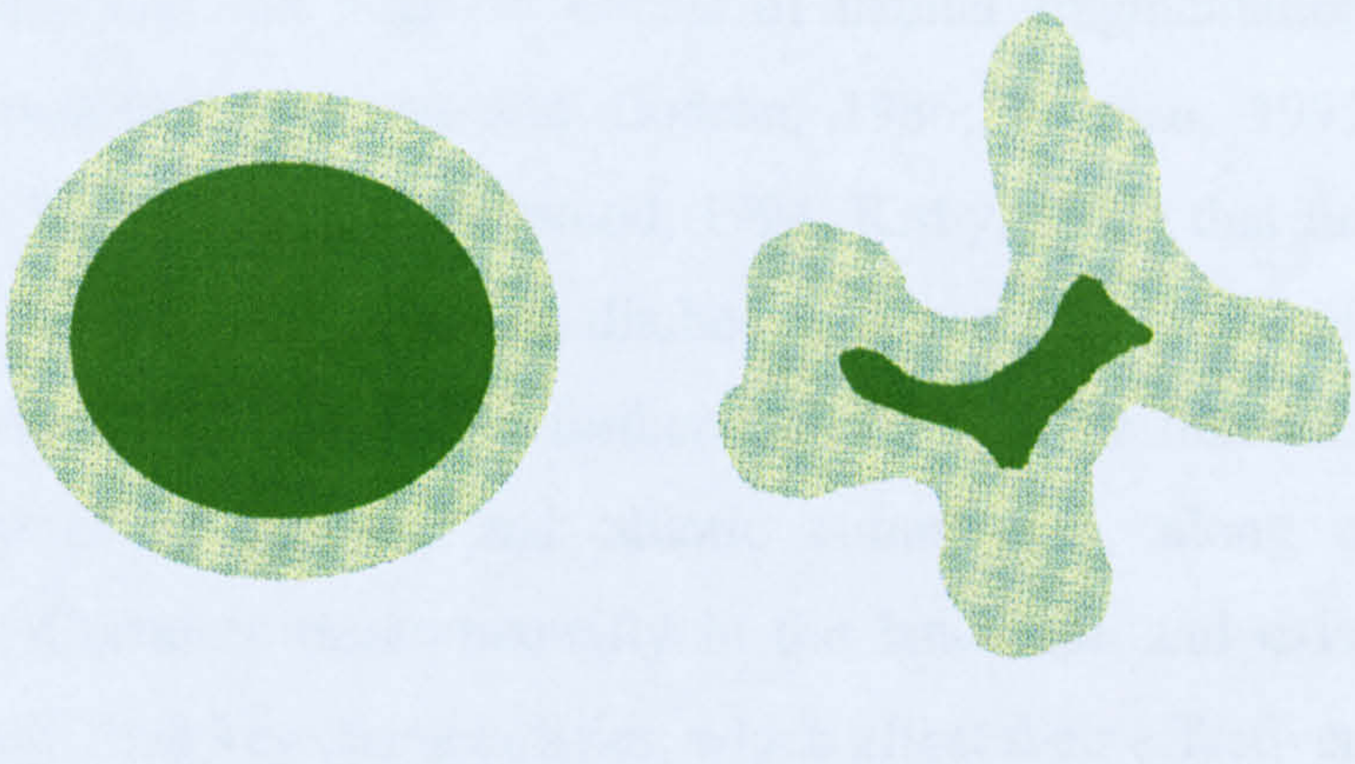


Figure 3.4 - Impact of edge effects on similar size circular and irregular shaped habitats

The importance of conserving these core habitat fragments is widely acknowledged, as they provide strongholds for remaining fragmented populations, and form the basis for the re-colonisation of adjacent habitats.

3.3.2 Buffering Areas

Buffer areas are strips of countryside adjacent to habitat patches where the environment differs significantly from the inner environment of the patch. The design of buffer areas, and the activities accommodated within them, are based on expected impacts from the external landscape. They are often intended to mitigate the deleterious impacts associated with edge effects, for example, the drift of agrochemicals from intensive agricultural practices or predation from hostile species. Buffer zones of less valued habitat can be retained, to form a spatial shield, around priority areas that are considered more valuable, such as breeding areas or communities that are sensitive or particularly species rich: "In the Pinhook case study, a half-mile buffer of upland vegetation was included as protection for the more valuable wetland communities" (Peck, 1998, p.57).

3.3.3 Connecting Areas

In addition to conserving individual habitat patches, awareness of the effects of habitat reduction and fragmentation has led conservationists to consider strategies to maintain a degree of landscape connectivity. According to landscape ecological theory, the preservation of vegetated corridors among otherwise isolated habitat remnants is

predicted to moderate the negative effects of habitat fragmentation by maintaining landscape connectivity (Forman and Godron, 1986; Forman, 1995). It is widely presumed (e.g. Spellerberg and Gaywood, 1994; Kirby, 1995) that linear features such as hedgerows, verges and drainage ditches will promote physical 'connectedness' between isolated habitat fragments, further facilitating their functional 'connectivity', where movements of species, and abiotic components, along corridors can be demonstrated. Corridors occur naturally in the landscape and exist as remnants of native vegetation; their key characteristics, which affect their effectiveness, include their length, continuity, width, age and diversity.

However, debate continues on the relative merits of corridors as an effective tool in the conservation of biodiversity (Simberloff and Cox, 1987; Hobbs, 1992; Simberloff *et al.*, 1992; Andrews, 1993; Dawson, 1994). On the one hand, corridors are seen as a simple, tangible and easily implemented solution to improve a fragmented landscape; whereas, on the other hand corridors are perceived as a waste of conservation resources which at best have little impact on overall conservation objectives (Hobbs and Wilson, 1998). Corridors are now often regarded as an essential element in biodiversity conservation, when considered in relation to other landscape conservation options, though they can no longer be regarded, in isolation, as the primary solution to habitat fragmentation.

3.3.4 The Surrounding Matrix

The matrix surrounding isolated habitat patches and corridors, analogous with the 'ocean' in island biogeography, is considered particularly important since many interactions occur between habitat patches and its adjacent landscape. While it is gradually becoming accepted that corridors can contribute to improving the connectedness and connectivity between isolated fragments, a landscape can retain a high degree of connectivity even in the absence of corridors. Unlike true oceanic islands these habitat fragments are not entirely isolated from each other; indeed, many of them may have connected populations within the surrounding matrix. The ability of species to negotiate passage across the wider matrix, to reach another conducive patch, is dependent upon the 'permeability', where the matrix is not wholly hostile, and 'porosity', where stepping stones of favourable habitat occur within a hostile matrix. Certain birds, for example, can travel from patch to patch over inhospitable habitat, as

long as the patches are located within dispersal range, although this type of movement is limited to species with high dispersal ability.

In a country with intensive food and timber production and decreasing diversity, the surrounding matrix appears to be becoming increasingly hostile to many species. The dependency on these intensive agricultural systems is decreasing the functional connectivity of the landscape, further isolating the remaining habitat fragments.

3.4 LANDSCAPE ECOLOGY AS A BASIS FOR BIODIVERSITY PLANNING

According to Selman (1991; 1992; 1993; 1996) landscape ecology will have contributed little if it merely remains a theoretical study framework. It is essentially an application-oriented discipline, and one of its major applications lies in the guidance of planned land-use change. Similarly, Dramstad *et al.* (1996, p.7) have argued that "landscape ecology has rapidly emerged in the past decade to become usable and important to practising land-use planners and landscape architects".

Whilst it is recognised that our interpretation of many landscape ecological patterns and processes remains contentious, there is general agreement about the need to reduce habitat loss and fragmentation and to improve the conservation potential of the wider countryside. Much of the work underpinning the principles of landscape ecology is often species specific, and what may be good for one species may be bad for another. For instance, a poorly dispersing species may 'view' the countryside as fragmented, whereas a wider ranging species would 'perceive' it as continuous.

It is understood that there are no universal models of landscape ecology that will benefit all species. The need for more locally distinctive landscape models, to define critical limits of habitat size and inter-patch distance, is accepted. However, conservationists cannot afford to wait for the perfect solutions, but have to act with the best information available. Ecologists have often been criticised for their reluctance at times to deploy incomplete knowledge. Therefore, one of the arguments in favour of adopting the general principles of landscape ecology to guide biodiversity planning, is the precautionary principle, which has been re-stated in this context by Baldock *et al.* (1996, P.52) as "where there is a threat of significant reduction or loss of biodiversity,

lack of full scientific uncertainty should not be used as a reason for postponing measures to avoid or minimise such a threat". Hobbs (1997) reflects this need to take action by stating that landscape ecologists can either take an active role in shaping the countryside, or passively monitor its degradation.

3.4.1 Defining Wider Countryside Objectives

In applying the principles of landscape ecology to biodiversity planning, McIntyre and Hobbs (1998) suggest that a consideration of the relative degree of habitat destruction and modification provides a clear starting point for defining which wider countryside objectives are appropriate. Table 3.1 details the objectives suggested by McIntyre and Hobbs (1998) for varying degrees of landscape alteration. Their framework focuses on the *maintenance*, *improvement* and *reconstruction* of the key ecological elements of the landscape: patches/fragments; connecting and buffering areas; and the surrounding matrix, as previously defined in Section 3.3.

Table 3.1 - Wider countryside objectives related to the landscape alteration level

Wider Countryside Objective	Landscape Alteration Level			
	Intact <10% destroyed Low level of modification	**Variegated** 10-40% destroyed Low - high modification	**Fragmented** 40-90% destroyed Low - high modification	**Relictual** >90% destroyed Mostly high modification
Maintenance	Matrix	Matrix, Patches	Fragments	-
Improvement	-	Connecting / Buffer	Fragments	Fragments
Reconstruction	-	-	Connecting / Buffer	Buffer areas

Source: Based on (McIntyre and Hobbs, 1998).

McIntyre and Hobbs (1998) recognised two gradients of landscape alteration: i) destruction and ii) modification, suggesting that both can be conceptualised as a continuum, with each being associated with the effects of disturbance resulting from human activities. Habitat destruction results in loss of all structural features of vegetation and loss of the majority of species. The framework defines four distinct levels of habitat destruction, with *intact* and *relictual* landscapes representing the extremes, in which less than 10% or over 90% of the area of habitat is destroyed, respectively. In between these extremes, the matrix of a *variegated* landscape is still formed by habitat, whereas in a *fragmented* landscape, the matrix consists of 'destroyed

habitat'. This distinction between variegated and fragmented reflects suggestions that landscapes containing more than 60% of habitat, by area, are operationally not fragmented, since they consist of a continuous cluster of habitat (Wiens, 1997). Landscape modification creates another layer of variation in the landscape, over and above the straightforward pattern caused by habitat destruction, although if the modifying disturbance is intense, or protracted enough, it will eventually lead to habitat destruction. Thus the patterns of habitat destruction in Table 3.1 could be created quickly, through broad-scale habitat clearance, or gradually over time as a result of the cumulative effects of intense modification.

The framework further defines management objectives for each level of landscape alteration. The first action is based upon the maintenance of the remaining areas of habitat. This is regarded as a baseline activity and its importance lies in the fact that it is much easier to avoid the effects of degradation than it is to reverse them. As a result, McIntyre and Hobbs (1998) consider *maintenance* to be a priority for intact and variegated landscapes, which are relatively unaltered, whereas, in more highly modified landscapes it may be necessary to instigate more active management efforts to *improve* the condition of the habitats. There would also be opportunities to *reconstruct* areas of habitat, in landscapes where their total extent has been reduced below a viable size. However, as habitat reconstruction is difficult and expensive, it is considered as a last resort that is most relevant to fragmented and relictual landscapes. McIntyre and Hobbs (1998) stress that restoration will not come close to restoring habitats to their unmodified state, reinforcing the wisdom of maintaining existing landscape as a priority.

A similar framework has also been proposed by Warnock and Brown (1998), which emphasises the need for a strategic framework, based upon the character and condition of the countryside, to guide management actions. Their framework advocates the need to *conserve* important 'good condition' elements of the countryside, in contrast to the *creation* potential of less important, 'poor quality' areas of the landscape. In between these extremes, there are options for *enhancement*, closely reflecting the three distinct actions suggested by McIntyre and Hobbs.

The identification of where a particular landscape sits in terms of its degree of destruction and modification is essential for deciding where the management priorities

should be. While this may appear obvious, a failure to recognise the different management needs in different landscapes can result in a significant mis-application of scarce resources into activities that are either inappropriate or unnecessary. Having said that, McIntyre and Hobbs (1998) acknowledge that these are broad landscape objectives and the extent to which they can be used to generalise across similar landscapes is unknown. They suggest the important next step is to develop and test more detailed management scenarios for particular landscapes.

3.4.2 Examples of Biodiversity Planning Based Upon Landscape Ecological Principles

3.4.2.1 EECONET

On a European scale, a good example of a planning approach based upon the principles of landscape ecology is the EECONET concept (Institute for European Environmental Policy, 1991), which is being promoted by the government of The Netherlands as a strategic approach to the protection and enhancement of Europe's biological and landscape diversity. EECONET seeks to reverse the fragmentation of habitats into small, isolated islands by establishing and developing a coherent European network of habitats based on four kinds of action, closely reflecting the key ecological features as identified in Section 3.3, as defined below:

- better protection of core areas;
- the development of support zones around these;
- the creation of corridors between these; and
- the restoration of damaged habitats.

This new approach is about strategic environmental planning, based less on traditional defensive approaches and more on creative and adaptive techniques. The concept also envisages that the same principles will be applied at local levels, where - for example - hedgerows and streams, rather than mountain ranges and large rivers, link locally important areas of landscape and habitat.

3.4.2.2 Countryside Characterisation

At a more local level, the recent approach of characterising the countryside, adopted by both English Nature (1993; 1998) and the former Countryside Commission (1995; 1996), is indicative of a planning style incorporating the general principles of landscape ecology. The characterisation process reflects the desire to address wider countryside issues by incorporating objectives for both nature and landscape conservation across whole landscapes. The resulting Natural and Character Areas are not designations, but are areas of countryside defined by the distribution of wildlife and natural features, and by the land-use pattern and human history of each area. It is suggested that these Areas offer a more effective framework for the planning and achievement of wider countryside objectives across a wide tract of countryside than do traditional administrative boundaries:

> We believe that Natural Areas provide an improved framework for securing public support for wildlife conservation, and that development of the idea will greatly improve our ability to work together with others to deliver effective nature conservation. (Hughes and Tonkin, 1997, p.i)

These Areas are intended to provide a framework to link local and national priorities, at a scale that helps local decision makers to understand the wildlife resources in their area, relative to their place within the country as a whole. Indeed, Derek Langslow, former Chief Executive of English Nature, describes how the Natural Areas concept is being promoted as a key component of English Nature's future conservation strategy:

> Wildlife is not restricted to designated and protected sites such as nature reserves or SSSIs; it occurs throughout the countryside, coast and built up areas of England... The Natural Areas approach gives us a way of determining priorities for nature conservation areas with ecological and landscape integrity, and to set objectives which reflect these priorities. (Hughes and Tonkin, 1997)

3.4.2.3 Habitat Restoration Project

In England, theoretical research on habitat fragmentation has begun to attempt to translate some of the principles of landscape ecology into a form that would be directly useful to conservation workers (Kirby, 1995). Kirby (1995) claimed that many habitats in England are now more fragmented (the patches are smaller and more isolated from each other) than they were 50 years ago, suggesting that there is sufficient evidence that this is potentially an important cause of declines in biodiversity. Kirby (1995)

identified the need for further research and trials to translate landscape ecological theories into practical conservation strategies, with a need to develop more opportunities for species to move through and thrive in the whole countryside, rather than being restricted to isolated sites.

This work led to the formation of the Habitat Restoration Project, which has taken a co-ordinated, practical approach to the restoration of a 'wildlife friendly' landscape outside protected sites. The most significant new aspect of the Project has been its holistic landscape-scale approach to habitat restoration within the landscape, adopted through the 'vision map' approach (Thomas, 2000). The pioneering use of 'vision maps', translated national, regional and local targets, in four contrasting trial areas, to appropriately quantified landscape-scale restoration objectives based on geology, topography, hydrology and land use, as shown in Figure 3.5. Each map, which covered an area of approximately 100km^2, showed the distribution of existing semi-natural habitats and suggested which habitats would be most appropriately restored to which locations to provide the greatest wildlife benefit. These trial areas were considered small enough that only a few landowners would be involved, but large enough that changes could be measured over the landscape scale.

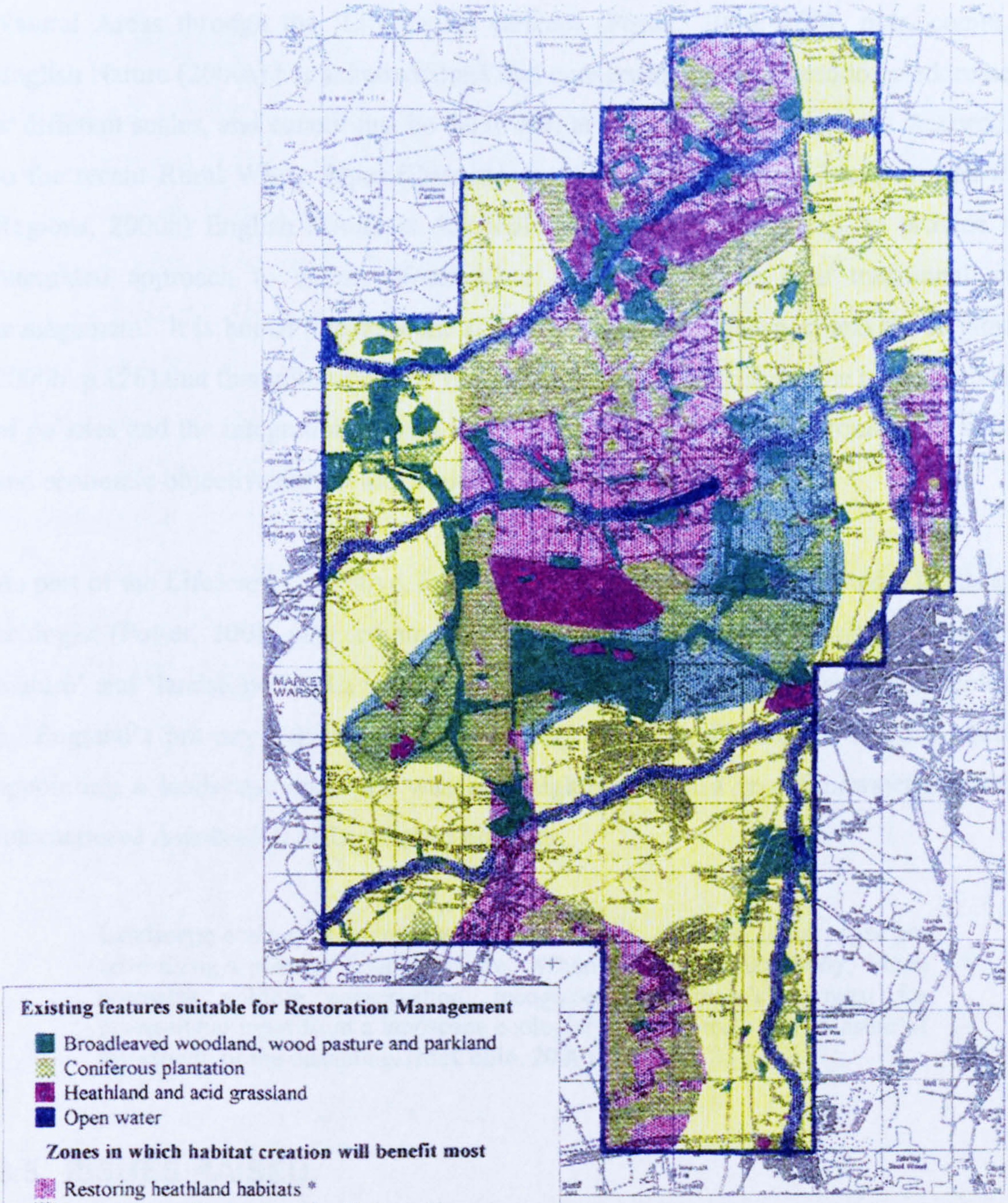


Figure 3.5 - Example of a 'vision map' used in the English Nature Habitat Restoration Project

Source: (Thomas, 2000) © Crown Copyright

There is now an intention to expand this indicative planning approach, based upon landscape ecological principles, from the four 100km^2 trial areas to a number of entire Natural Areas through the 'Lifescapes' concept (Porter, 2000; 2001, pers. comm.). English Nature (2000a) has acknowledged that conservation issues need to be addressed at different scales, and cannot just be dealt with at the individual site level. According to the recent Rural White Paper (Department of the Environment, Transport and the Regions, 2000b) English Nature is developing the Lifescapes concept to provide an integrated approach to nature conservation at a wider scale than traditional site management. It is hoped (Department of the Environment, Transport and the Regions, 2000b, p.126) that this initiative will "maximise the opportunities for the better delivery of policies and the integration of landscape, wildlife, and general environmental, social and economic objectives at a wider scale".

As part of the Lifescapes initiative, English Nature have recently appointed a landscape ecologist (Porter, 2001, pers. comm.), further acknowledging the connection between 'nature' and 'landscape' and a wider acceptance of the principles of landscape ecology by England's primary nature conservation body. The significance of English Nature appointing a landscape ecologist was also highlighted in a recent newsletter of the International Association of Landscape Ecology.

> Landscape ecology is becoming widely accepted... Indeed, these pages are advertising a post for English Nature. When the Government body, which promotes wildlife conservation, recognises that there's a need for professional input from a landscape ecologist then this truly is a measure of the growth of the discipline. (McCollin, 2000)

3.5 ISSUES RAISED

The emergence of landscape ecology provides a unique opportunity to understand the dynamic, functional nature of the wider countryside, by focussing upon particular patterns and processes, such as those advocated by metapopulation models. This understanding of the wider countryside promotes the identification of key ecological features - habitat patches, buffer areas, connecting areas, and the surrounding matrix - upon which these patterns and processes are reliant, thereby providing a focus for biodiversity action. The recent growth of landscape ecology based biodiversity plans, reviewed at the end of the chapter, confirms the general relevance and usefulness of landscape ecological solutions to biodiversity planning.

CHAPTER 4 IMPLEMENTING BIODIVERSITY PLANS

4.0 CHAPTER OUTLINE

This chapter initially examines the planning systems currently operating within the English countryside, to allow the identification of the key implementation mechanisms available for biodiversity plans. It also investigates the implementation process, in general, to provide an insight into the inevitable 'implementation gap'. It is widely recognised that the intentions of those devising policy and plan 'outputs' are not always easily translated into effective 'outcomes' on the ground. In particular, the implementation of landscape ecological plans on the ground faces many problems, as there are few land-use controls, and only limited incentives. This investigation of the implementation process also provides a basis for an analytical framework in which to study the actual 'opportunities' and 'barriers' impacting upon the implementation of biodiversity plans. This chapter concludes with some practical experiences of the implementation process, specifically those associated with the implementation of biodiversity plans.

4.1 COUNTRYSIDE PLANNING

Planning for the countryside in Britain has traditionally been based around two distinct planning systems: Town and Country Planning (development) and Resource Planning (agriculture, forestry, etc.). However, the progressive emergence of more informal non-statutory planning instruments suggests that these current systems may be inadequate at addressing biodiversity conservation in the wider countryside.

4.1.1 Town and Country Planning

The maintenance and enhancement of the countryside has historically been entrusted to a town and country planning system operating through mechanisms of statutory development plans and development control:

> An agreed future framework is enshrined in statutory land-use plans, and applicants wishing to undertake development must submit their proposals to the relevant local administration so that they can be controlled in accordance with the policies and proposals contained within the plan. (Selman, 2000, p.77)

This planning system was primarily concerned with the threat to the countryside from development during post-war reconstruction. Curry and Owen (1996) describe the emergence of a 'no development ethic', in response to the exploitation of the countryside, for food and timber, which were of paramount importance to post-war reconstruction. The resultant planning system, which has remained largely unchanged ever since, is designed to control development, narrowly defined as building, civil engineering and mineral extraction, but not agriculture or forestry, which were regarded as being in harmony with the countryside in the pre-war landscape. However, Selman (2000, p.80) considers the exclusion of agriculture and forestry from the planning system, as having "profound implications for the management of change in the biophysical environment". Curry and Owen (1996) confirm that the principal environmental damage has not been caused by development *per se* but rather agriculture and forestry operations that have been largely exempted from planning controls.

The intensification of forestry and agriculture after the second world war, mechanisation, increasing use of a range pesticides and inorganic fertiliser, the structural changes in the farming industry and the socio-economic changes in the countryside had significant impact on wildlife habitat both within protected sites and the wider countryside (Adams, 1986; 1996b). These changes have not only caused damage to the countryside, but have resulted in habitats becoming increasingly isolated from each other and from other habitat fragments. Adams (1996b, p.31) claims "the importance of agriculture as the engine of habitat loss was not adequately foreseen in the 1940s". Therefore, the assumption made in post-war reconstruction planning, that substantial wildlife interest would remain in the agricultural landscape has not been borne out in practice (Adams *et al.*, 1994).

4.1.2 Resource Planning

The imperative for food and timber production in post-war Britain, resulted in the development of "an almost entirely distinct and dominant system of planning in rural areas: resource planning" (Curry and Owen, 1996, p.2). Resource planning was based around the idea that agriculture and forestry should remain largely unfettered by the *controls* of the town and country planning system, being reliant upon much more powerful economic *incentives*. As a result the town and country planning system could not refuse development for agricultural or forestry operations.

One possible means of overcoming the environmental crisis in the countryside and securing environmental objectives for agriculture and forestry could be to extend the powers of the planning system, which was originally conceived as having responsibility for the environment. However, agricultural policy reforms would suggest otherwise. The Common Agricultural Policy (CAP), the main economic engine of landscape change, has tended to work against landscape ecological interests, especially since Britain has been a reluctant 'greener' of agricultural policy unwilling to 'de-couple' farm payments for agricultural production. Rather than empower the statutory planning system, agricultural policies have adopted their own environmental objectives. These environmental policies, for agriculture and forestry, continue to be reliant upon financial incentives for implementation. These sectors can be *paid* to pursue environmental goals, particularly in the context of nature and landscape conservation, whilst other sectors are *constrained* to pursue them through the statutory planning system. Curry and Owen (1996), importantly, point out that these environmental policy mechanisms in agriculture are invariably voluntary, whereas for all other sectors they are compulsory.

4.1.3 Informal Planning

The recent growth of informal (i.e. non-statutory) conservation plans signifies an increasing recognition of the inherent weaknesses of the existing planning systems. The town and country planning system, with its responsibility for environmental concerns, is ineffective in controlling agriculture and forestry, the main drivers of countryside change, whereas the dominant 'resource planning' system has previously lacked environmental objectives.

> It could be contended that both the environmental and human crises in the countryside can be attributed in large part not just to misdirected policies *per se*, but to the maintenance of two distinct and unrelated planning systems. The town and country planning system has been successful in not allowing development in the countryside and the resource planning sector has been able to procure more food than we need. (Curry and Owen, 1996, p.3)

Indeed, planning officers have cited the pace of agricultural change as the most common spur to the initiation of informal strategies (Stansfield, 1990). According to Curry and Owen (1996, p.13) informal plans, which "have burgeoned during the 1990s... have had a degree of success, at least in part, in overcoming a shortfall in responses to rural needs from the two formal planning systems". Many of these informal plans, which embrace

aspects of agriculture and forestry, are attempting to provide a longer-term strategic framework for the countryside, whilst still allowing for a degree of local distinctiveness. In contrast, the resource planning system, which directs agriculture and forestry, operates on a shorter time scale, being dependent on annual price negotiations and annual compensation level payments. Resource planning is also dominated by national and European imperatives, which make it difficult to take regional countryside variations into account, other than by the virtue of the predominance of distinct farming systems in different geographical areas.

4.1.3.1 Local Biodiversity Action Plans

A topically relevant example of informal planning is the LBAP process, which is being promoted as a means of ensuring that the UK BAP (UK Government, 1994a) is translated into effective action at the local level, as briefly outlined in Section 1.3.2. The reliance on this type of non-statutory planning system to deliver the UK BAP, clearly demonstrates the limitation of the existing planning systems to tackle the problem of biodiversity conservation in the wider countryside.

The UK BAP (UK Government, 1994a) sets out a broad strategy for conserving and enhancing wild species and wild habitats in the UK for the next twenty years. The ability of LBAPs to translate the national strategy into strategic frameworks at the regional level has been recognised, as has the importance of placing progressively greater emphasis on implementation at the more local level (UK Local Issues Advisory Group, 1997b). However, as previously noted, the precise way in which LBAPs have been developed and will develop in the future will inevitably vary according to local circumstances. In light of the lack of statutory controls over the countryside, the successful implementation of LBAPs is heavily dependent upon informal approaches based upon partnerships. LBAPs have, by definition, a shared agenda, based upon consensus, for conserving and enhancing the biodiversity of an area. Indeed, partnerships are seen as crucial to the success of LBAPs.

> The purpose of Local Biodiversity Action Plans is to focus resources to conserve and enhance biodiversity by means of local partnerships, taking account of both national and local priorities. (UK Local Issues Advisory Group, 1997b, p.5)

The UK Local Issues Advisory Group (1997b, p.5) notes "the need for a 'lead body', but to be successful the process should be owned by all parties who have a key role in delivering the product". They suggest that local authorities are ideally suited to provide the necessary lead for this process, working with statutory conservation and countryside agencies, local and regional voluntary organisations, land managers, businesses, local record centres and those with specialist knowledge of local wildlife. They also regard the statutory and voluntary agencies as particularly important members of the partnership (UK Local Issues Advisory Group, 1997b; a). In addition to identifying partners, it is essential to ensure a common understanding of the purpose of the process, respective roles and methods of working at an early stage. This emphasises the importance of education and communication, in particular the links with other organisations and their plans and strategies.

It is believed that a partnership approach will ensure that the workload is shared and a wide range of resources and skills are utilised. It is also hoped that a partnership will foster a shared commitment to, and ownership of, the plan process, providing a commitment to the implementation of the plan (UK Local Issues Advisory Group, 1997a).

4.1.3.2 Habitat Restoration Project

The Habitat Restoration Project, first discussed in Section 3.4.2.3, also aimed to adopt a more holistic, landscape approach to biodiversity conservation, although this was entirely dependent on the voluntary principle and the use of existing grant aid mechanisms. The individual vision maps, for each of the four trials areas, were drawn up in consultation with local landowners, nature conservation organisations and other land management agencies through a local steering group. The voluntary principle operated throughout and project officers used the maps as an educational tool to clarify what the informal plan meant to individual landowners. It was strongly emphasised (Thomas, 2000) that the vision maps had no statutory function and carried the following rider:

> This vision plan shows an idealised picture of areas where the restoration or creation of particular habitats would be most beneficial to wildlife. The actual location of the new habitats will of course depend on individual farm circumstance. (Thomas, 2000, p.12)

As reported earlier (Section 3.4.2.3), there appears to be every intention to expand this informal planning approach to a wider area, through the 'Lifescapes' concept in an attempt to provide an integrated approach to nature conservation at a wider scale than traditional planning systems allow.

4.1.3.3 Regional Scale Planning

A highly significant innovation in land use planning in the UK has been the 're-discovery' of the regional dimension (through Regional Development Agencies in England, and Parliament/Assemblies elsewhere in the UK), which has brought with it a need to address sustainability and biodiversity issues at broad geographical scales. A landscape ecological perspective is likely to be central to resolving the challenge of planning at this scale.

One of the few attempts so far to address this challenge has been in north west England, where an approach based on landscape 'domains' seeks to apply the insights from landscape ecology and new approaches of landscape assessment, such as Natural/Character Areas (as discussed in Section 3.4.2.2), in order to develop a coherent framework for landscape planning (Handley *et al.*, 1998). The strategy defines five distinct landscape domains that emphasise the commonality between the thirty Countryside Character Areas in the north west region. The domains, which have by definition features of common interest, are identified as: the coast, the urban core, the urban fringe, the rural lowland, and the rural upland. These domains form the framework for a regional landscape strategy, which:

> … seeks to provide the connection between action at the regional and the neighbourhood levels through the co-ordination, reinforcement and innovation of environmental activity... It provides a focus around which the interests of public, private and voluntary bodies can coalesce and a medium for the articulation of policy aspirations relating to the sustainable planning and management of landscapes. (Handley *et al.*, 1998, p.133)

However, attempts to address regional landscape issues remain at an early stage. It is likely that planners will face a range of barriers and opportunities in trying to implement them, and in harmonising them with sub-regional plans and strategies.

4.2 IMPLEMENTATION MECHANISMS

As a result of the limited power of statutory planning in the countryside, the implementation of biodiversity plans is reliant on the statutory planning system, to a limited extent only, and a suite of non-statutory planning mechanisms. Much of the policy that has developed in this context has involved the use of management agreements applied to specific sites of conservation value. Beyond this, in the wider countryside, conservation was largely left to the choice of individual farmers, placing considerable importance on voluntary organisations to provide conservation advice (Adams *et al.*, 1994). However, these non-statutory mechanisms lack the implementation powers of the statutory instruments, relying on voluntary mechanisms, described by Gilg (1996) as 'broadly neutral' in the Gilg/Selman spectrum of planning powers (Table 4.1). More recently, the focus of policy has broadened, embracing environmental land management schemes (ELMS), for example, Environmentally Sensitive Areas and the Countryside Stewardship Scheme, which is regarded as a more 'positive' planning option in the Gilg/Selman spectrum.

Table 4.1 - The Gilg/Selman spectrum of planning options

Positive ←	**Neutral**	→ **Negative**
Public ownership or management of land via long-term leases	Voluntary methods based upon exhortation, advice, and demonstration, but often backed up with the threat or promise of one of the other methods	Regulatory controls, mainly negative, for example, planning permission
Financial incentives to encourage production and/or desirable uses		Monetary disincentives to discourage production and/or undesirable uses

Source: Adapted from (Gilg, 1996).

According to Gilg (1996) planning for the countryside has traditionally involved ameliorating the deleterious effect of either internal or external forces, by working through the Gilg/Selman model of planning options.

> For example, a farm may have a fine wildflower meadow particularly along a streamside public footpath. Internal financial forces may push the farmer to plough it up, while external forces may damage it by excessive recreation... The planning response would normally be to *advise* the farmer

> not to plough it up and to play on his public spiritedness. If that failed, then a *management agreement* could be offered, and then if that failed, a Site of Special Scientific Interest could be declared. (Gilg, 1996, p.185)

The recent launch of the England Rural Development Programme (Ministry of Agriculture, 2000b) underpins the Government's new direction for agriculture by helping farmers and foresters to respond better to consumer requirements and become more competitive, diverse, flexible and environmentally responsible. In particular, it emphasises the importance of the 'positive' ELMS to aid this transition, by continuing with the Environmentally Sensitive Areas and substantially expanding Countryside Stewardship and other similar ELMS. However, these schemes will still have a limited availability and the 'neutral' planning options based upon exhortation, advice and demonstration, will continue to have a significant role to play in the wider countryside.

4.2.1 Conservation Advice

A key approach to enhance the wider countryside is to encourage farmers to take a more active interest in conservation and to adopt more wildlife friendly agricultural practices. A principal influence has been the provision of conservation advice through the Farming and Wildlife Advisory Group (FWAG) and the Farming and Rural Conservation Agency (FRCA, recently changed to the Rural Development Service RDS), the Government's agricultural extension service (Cox *et al.*, 1990). Although the original national FWAG was established in 1969, it had a rather obscure existence until the early 1980s when MAFF started to see its potential for advancing their own statutory responsibilities for the wider countryside (Selman, 2000). The aims of FWAG are to:

- provide practical advice and encouragement to farmers and landowners who wish to undertake conservation measures;
- provide for the contact and discussion between farmers and conservationists;
- develop understanding between farming and conservation interests through practical demonstrations, publicity, talks and conferences; and
- identify opportunities, conflicts or developments which require study and research.

Although the UK, and England in particular, has been to the fore in developing a farm conservation advice service, Winter (1996a) raises a number of problems with the current advisory service. Chief amongst these are:

- a fragmented service with a large number of potential suppliers of advice;
- a relatively low level of advisory penetration into the farming community;
- a geographically uneven coverage;
- the suggestion that compliance rates are not as high as they might be and that farmers are particularly disinclined to comply with certain types of more challenging advice;
- concern over some aspects of the quality of advice offered.

In light of these concerns and the continued emphasis placed upon these voluntary approaches, there is a widely accepted need for an improved system of co-ordination and delivery for advice and information on environmental land management for English farmers (Winter, 1996a).

4.2.2 Management Agreements

In its work, the former Ministry of Agriculture, Fisheries and Food, now part of the Department for Environment, Food and Rural Affairs (DEFRA), is seeking to balance the different demands made on the countryside. On the one hand, they are seeking to ensure plentiful food supplies, putting pressure on farmers to work their land intensively, whilst, on the other hand, they are attempting to protect the environment from these intensive agricultural practices. Increasingly, therefore, direct payments have been used to reward farmers for the production of non-agricultural goods, including those of an environmental nature. The provision of financial incentives to encourage more environmentally friendly practices is regarded as a more powerful 'positive' planning alternative, in contrast to the weaker 'neutral' provision of conservation advice, according to the Gilg/Selman spectrum in Table 4.1.

DEFRA currently has two main schemes to encourage the adoption of environmentally sensitive land management practices: Environmentally Sensitive Areas (ESA), which cover over 10% of all agricultural land; and Countryside Stewardship, which aims to enhance conservation in targeted landscapes and habitats and to improve public access

to the farmed countryside, outside ESAs (Ministry of Agriculture, 2000a). It must be emphasised that participation in either scheme is entirely voluntary.

4.2.2.1 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) were introduced in 1987, to offer incentives to farmers to adopt agricultural practices that would safeguard and enhance parts of the country of particularly high landscape, wildlife or historic value. There are currently 22 ESAs in England covering over 1 million hectares of agricultural land (Ministry of Agriculture, 2000a). The Scheme, which is available to all farmers within the ESA, involves farmers voluntarily entering into 10-year management agreements with DEFRA, under which they receive an annual payment on each hectare of land under agreement. Agreement holders have to follow specific management practices designed to conserve and enhance the landscape, historic and wildlife value of the land under agreement. Annual payments range from £8 to £500 per hectare depending on the management practices adopted. In addition, payments are available for the provision of new public access and for a range of capital works which varies depending on the specific objective of the ESA.

4.2.2.2 Countryside Stewardship

The Countryside Stewardship (CS) scheme operates throughout England outside Environmentally Sensitive Areas. It makes payments to farmers and other land managers to enhance and conserve English landscapes, their wildlife and history and to help people to enjoy them. Its aims are to:

- sustain the beauty and diversity of the landscape;
- improve and extend wildlife habitats;
- conserve archaeological sites and historic features;
- restore neglected land or features;
- create new habitats and landscapes; and
- improve opportunities for people to enjoy the countryside.

Countryside Stewardship is a voluntary scheme and is available to farmers and non-farming land owners and managers (including voluntary bodies, local authorities and

community groups) who enter 10-year agreements, under which they manage land in an environmentally beneficial way in return for annual payments. However, CS is a discretionary scheme and only applications that offer good value for money will be accepted. Value for money will be judged against whether an application meets the national and local objectives for Stewardship and take into account benefits for wildlife, landscape and history and opportunities for people to enjoy the results. CS targets the conservation and enhancement of some key English landscapes, features and habitats, which include chalk and limestone grassland, lowland heath, watersides, coasts, uplands, historic landscapes, traditional orchards, old meadows and pastures, the countryside around towns including Community Forests, traditional field boundaries and the margins of arable fields. Annual payments range from £5 to £525 per hectare depending on the management practices adopted (Ministry of Agriculture, 2000a).

4.3 THE IMPLEMENTATION PROCESS

The importance of understanding the implementation stage of the decision-making process had been relatively neglected until the 1970s, and attention had mainly been focused on the policy formulation 'front-end' (Parsons, 1995). However, it became apparent that many policies and programmes had not achieved their stated goals, and had at times even made circumstances worse (Parsons, 1995; Winter, 1996b). Thus, the intentions of those devising policy 'outputs' are not always easily converted into 'outcomes', leading to an 'implementation deficit' (Weale, 1992). One of the problems with classical policy analysis is that it has tended to under-estimate the significance of the experience of officers charged with local delivery of centrally determined policies. This has been represented in terms of a gap between policy-makers and administrators (Hargrove, 1975) and between organisations and 'street-level' bureaucrats or target groups (Winter, 1990; Wilson *et al.*, 1999).

Thus, the somewhat mechanistic basis for studying policy implementation (Pressman and Wildavsky, 1973; Jenkins, 1978) has developed into an approach that more fully acknowledges the grass-roots level (Parsons, 1995). Consequently, it is now more fashionable to interpret policy from a blend of top-down, middle-in and bottom-up perspectives. In this vein, Barrett and Fudge (1981, p.25) argue that implementation may best be understood in terms of a policy-action continuum, "in which an interactive and negotiative process is taking place over time, between those seeking to put policy

into effect and those upon whom action depends". In this context, Parsons (1995) observes that effective implementation is a condition built from the knowledge and experience of those in the front line of service delivery.

Most of the literature on implementation has been written by policy analysts, but there has also been some attention given more specifically to the implementation of spatial plans. Here, too, there is an implementation gap between the more pragmatic policy statements of local administrations or their proposals in relation to land acquisition and management, and the eventual outcome of adopted plans. Some attention has been give to this by writers such as Healey (1992) and Greed (1995), yet this applies mainly to the role of institutions and allocative mechanisms within the built development process. The theoretical interpretation of the plan implementation gap is, however, weakly developed.

The challenge facing this thesis was to establish a framework in which grass-roots level implementation of non-statutory documents, whose implementation was based on incentives and extension work, could be analysed in terms of their capacity to deliver sustainability objectives. It thus required a more plan-focused approach than that typically afforded by mainstream policy analysis, and a more rural/sustainability framework than offered by urban plan implementation theory.

Two emerging approaches, complementary in nature, seemed likely to offer possibilities. One was the general area of socio-environmental research referred to as 'barriers theory', that is, the knowledge of generic types of impediment which lead to sub-optimal environmental decision-making. Whilst it is conventional to refer to 'barriers', this is a somewhat pessimistic view of practices which frequently contain as many 'bridges' or 'opportunities' as they do barriers. Whilst this approach is widely referred to by practitioners and theoreticians, there is little critical literature, and its fullest exposition remains that of Trudgill (1990). A further technique which has been adopted by sustainability planners over the past decade is that of 'force field analysis', which has a respectable pedigree in business planning (e.g. Thomas, 1985), but whose relevance to the positive and negative forces acting to change or fossilise citizen behaviour has only recently been recognised by environmentalists (e.g. International Council for Local Environmental Initiatives, 1996).

These two approaches have formed the basis of the present research enquiry. They have the advantage that they are particularly apposite to sustainability planning, and yet have been under-developed as social science investigative methods in environmental research. They thus afford the opportunity of a systematic interpretive framework, and of methodological development for future investigations into the implementation of non-statutory plans for the wider countryside. As the general conceptual framework for the study, the 'barriers' methodology is set out in this chapter. As the main investigative tool, force field analysis is explained in Chapter 5.

4.3.1 Barriers to Biodiversity Planning

The seminal account of barriers to environmental improvement was that of Trudgill (1990), who argued that logical analysis of complex implementation issues would be aided by categorising barriers into six major groups - agreement, knowledge, technology, economic, social and political (Figure 4.1)

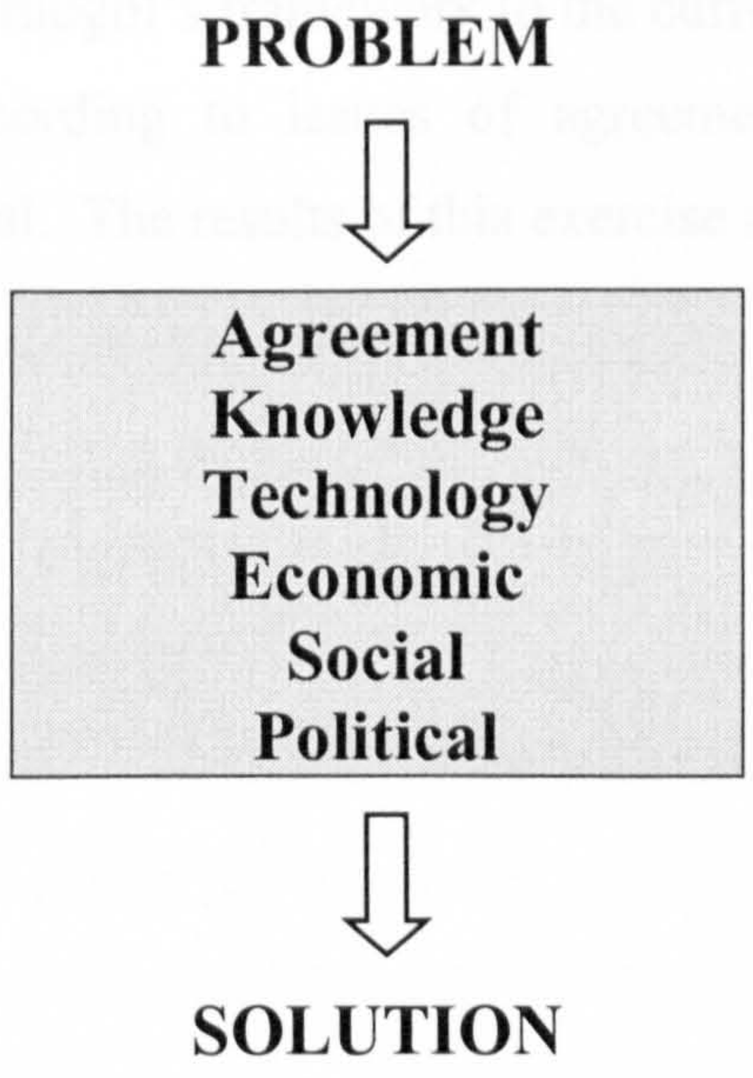


Figure 4.1 - Categories of barriers suggested by Trudgill (1990)

Trudgill suggests that these barriers often operate in a sequential fashion, so that at each stage of the implementation process we are either encountering an impediment or moving on to the next step in the process.

> Difficulties over *agreement* may be a major impediment. But if the first hurdle of agreement is crossed, we then ask whether or not the next barrier forms an impediment - is there adequate evidence or *knowledge*? (We may agree that something should be done about a problem, but we may not know what the cause of it is.) But if we do know what the cause is, we then ask

> whether we have an appropriate *technology* to tackle it. (We may agree on the problem, know what its cause is, but not have the means to tackle it.) If we do have an appropriate technology, do *economic* and *political* factors then form the crucial barriers ? (We may know what to do, but fail to do it for some reason, perhaps limited money, social constraint or political will.) (Trudgill, 1990, p.3)

It must be emphasised however, that such a taxonomy should not be seen as rigid, but merely a framework for discussion, as Trudgill (1990) noted many of the barriers can be seen to interact with each other in a rather fluid manner. The usefulness of using Trudgill's framework to categorise opportunities and barriers is also demonstrated by Vigar (2000, p.25), who used it as a "heuristic device to shed light on policy implementation opportunities and difficulties".

More specifically, in terms of barriers to biodiversity conservation, the suitability of Trudgill's framework is confirmed by evidence on UK habitat and species biodiversity targets identified by the recent Biodiversity Challenge report (2001). In order to illustrate the pertinence of Trudgill's framework to the current study, the findings of this report were re-worked according to issues of agreement, knowledge, technology, economic, social and political. The results of this exercise are summarised in Table 4.2.

Table 4.2 - Constraints to the achievement of biodiversity targets categorised within the barrier framework

Constraint	Significance (% of plans)		Barrier category
	Habitats	Species	
Inadequate information/research	50	76	**Knowledge**
High-level agriculture policy	57	29	**Political**
Limitations of agri-environment schemes	50	36	**Economic**
Lack of commitment in delivery	57	14	**Agreement**
Inadequate management on protected areas	36	32	**Economic**
Inadequate controls on water management or remedial action	43	7	**Technology**
Lack of resources for raising awareness or providing advice	14	20	**Economic**
Inadequate habitat protection or enforcement	14	17	**Political**
Lack of appropriate management of 'abandoned' land	7	15	**Technology**
Lack of habitat re-creation/recovery	0	15	**Technology**
Failure to develop policies to support natural coastal erosion	7	5	**Political**
Failure to balance needs of recreation and conservation	0	10	**Agreement**
Development planning failure	7	2	**Agreement**
Failure to influence other areas of policy (water/minerals policy)	7	2	**Political**

Source: Adapted from information contained in (Biodiversity Challenge, 2001).

The most striking message drawn from this analysis is that, despite extensive historical records of biodiversity, a *lack of information or research* is considered to be a major constraint for 76% of species action plans and 50% of habitat plans. More expected, are the major constraints imposed by *agriculture policy*. Lack of reform of high-level agriculture policy is a particular problem for species, such as the stone-curlew, marsh fritillary and three-lobed water crowfoot (Biodiversity Challenge, 2001).

Of particular concern, in terms of biodiversity planning, are the constraints associated with the key implementation mechanisms, as identified previously in this chapter. Alarmingly, a *lack of commitment to deliver BAP targets* was reported in over half of the habitat plans examined. The forming of partnerships and the agreeing of common objectives is a fundamental prerequisite for implementing biodiversity action (Section 4.1.3.1). However, this lack of commitment would suggest that many of these biodiversity partnerships are experiencing problems. Similarly, the *limitations of agri-*

environment schemes and the *lack of resources for raising awareness or providing advice*, both key implementation mechanisms (Section 4.2.2 & 4.2.1, respectively), are a cause for concern. "Inadequate funding or inappropriate prescriptions in agri-environment schemes was a major constraint for 36% of species, including the dormouse, silver spotted skipper and Deptford pink" (Biodiversity Challenge, 2001, p.20).

It is also notable that inadequate management of protected areas (either through a lack of funding or enforcement) is an issue for one third of the habitat and species plans examined. "This is particularly relevant for invertebrates such as the pearl-bordered fritillary, but also for some plants such as starfruit" (Biodiversity Challenge, 2001, p.20).

This exercise also highlights the relationships between the individual categories, as previously identified by Trudgill (1990). For instance, the limitations of agri-environment schemes may be classed as an *economic* barrier; however, the factors underlying the problem might be linked with inadequate *knowledge* of the limitations, dis*agreement* over the significance of the problem or a lack of *political* support to improve the situation. Similarly, the *inadequate management on protected areas* is based upon a lack of funding, an *economic* barrier, although, it may be more closely linked with a poor *knowledge* of management actions, a lack of *technological* expertise or dis*agreement* over management practices.

The importance of understanding the basis for these constraints clearly demonstrates the need to investigate the implementation process in greater detail, to identify not only the actual opportunities and barriers but also the factors underlying them. By identifying and understanding these underlying factors we can start to develop strategies to reinforce opportunities and overcome barriers.

4.4 ISSUES RAISED

This chapter has identified the limitations, and inherent weaknesses, of the existing countryside planning systems in conserving biodiversity in the wider countryside. As a result, the implementation of biodiversity plans is heavily reliant on an emergent system of non-statutory approaches, through the provision of conservation advice and voluntary

management agreements. However, there are inherent difficulties in relying on non-statutory systems to deliver biodiversity benefits, as there will be considerable difficulties in translating plan 'outputs' into effective 'outcomes' on the ground. The proposed analytical framework, based upon Trudgill's (1990) classification of barriers, provides a means of effectively examining the implementation process, to identify opportunities and inherent barriers, thus providing insights and solutions to aid effective implementation.

CHAPTER 5 METHODOLOGY

5.0 CHAPTER OUTLINE

The overall aim of this research, as stated in Chapter One, is to examine the factors underlying the barriers to, and opportunities for, implementation of plans for biodiversity in the wider English countryside, through the achievement of the six research objectives as previously detailed.

Chapter Two fulfilled Objective One by assembling evidence for the attrition of biodiversity within the wider countryside, whilst Chapter Three fulfilled Objective Two by identifying the key features which landscape ecologists would wish to see conserved within the wider countryside. The research methodology then focused on the achievement of the remaining objectives through a series of case studies, as detailed in Figure 5.1, which comprised four distinct steps:

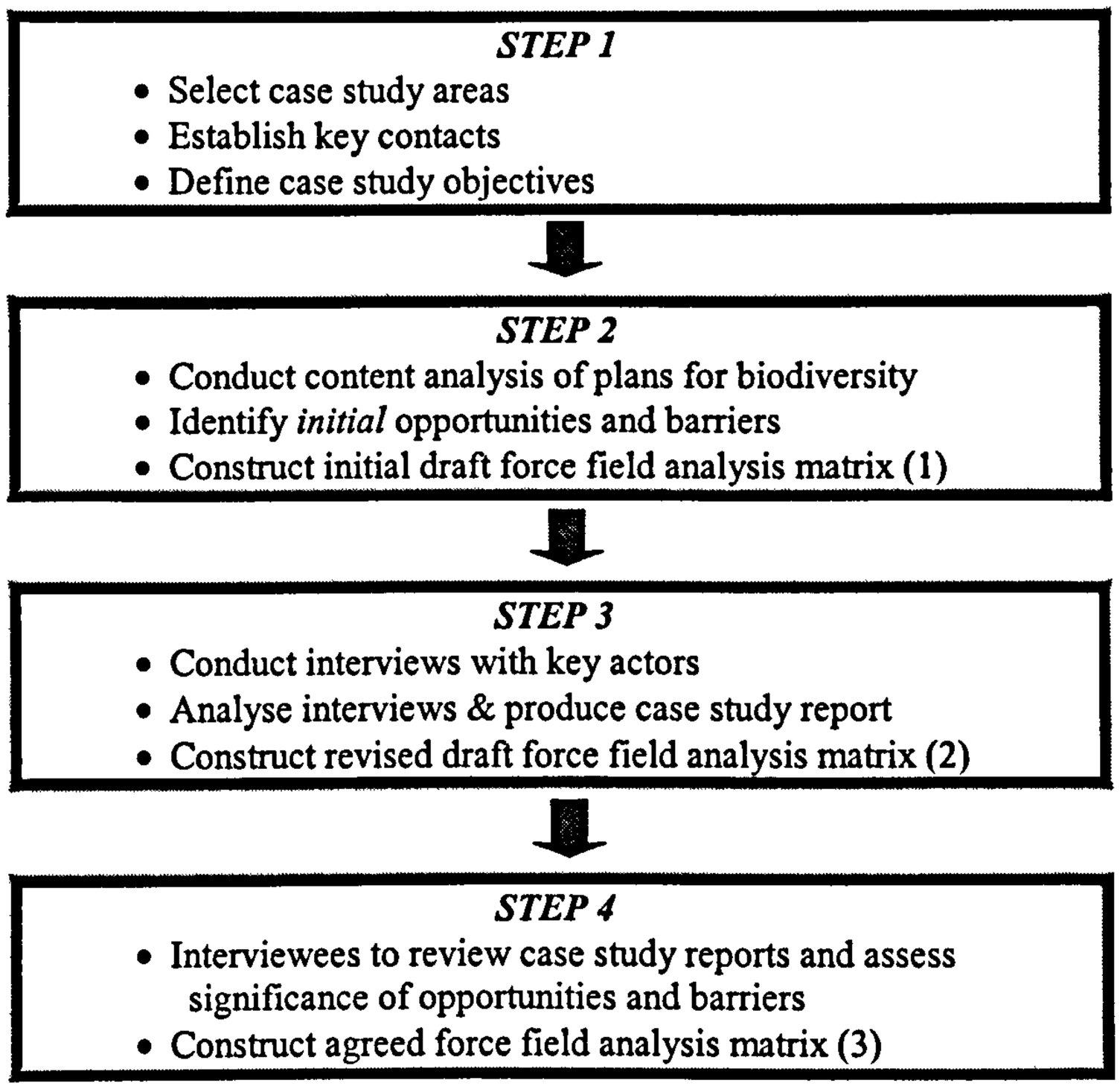


Figure 5.1 - Overview of methodology

Step 1 - selected the appropriate case study areas; established key contacts and defined the case study objectives.

Step 2 - identified relevant objectives and actions within a range of plans for biodiversity, and assessed their content in relation to the conservation of the wider countryside's key ecological features (Objective Three). The analysis of the biodiversity plans also allowed the identification of initial opportunities and barriers to the implementation of these plans (part fulfilment of Objective Four), with the results being presented within a force field analysis framework.

Step 3 - defined the actual opportunities and barriers by interviewing the key actors charged with the implementation of these biodiversity plans (part fulfilment of Objective Four). These interviews were based upon the initial force field analysis frameworks prepared in Step Two. Analysis of these interviews allowed the production of individual case study reports and updated force field analysis frameworks.

Step 4 - assessed the significance of each opportunity and barrier by asking the interviewees to review the case study reports and to rank the significance of each. These results allowed the construction of a final force field analysis framework, detailing the actual opportunities and barriers, and their relative significance, to the implementation of plans for biodiversity (completion of Objective Four).

5.1 CASE STUDY DESIGN

This research adopted a case study approach, described by Robson as:

> ... a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence. (Robson, 1993, p.146)

Case studies generally focus on one instance, or a few instances, of a particular phenomenon with a view to providing an in-depth account of events, relationships, experiences or processes occurring in that particular instance (Denscombe, 1998). The suitability of adopting a case study approach is confirmed by reviewing the key characteristics, as detailed in Table 5.1.

Table 5.1 - Characteristics of a case study approach

Depth of study	*Rather than*	Breadth of study
The particular	*Rather than*	The general
Processes/relationships	*Rather than*	Outcomes and end products
Holistic view	*Rather than*	Isolated factors
Natural settings	*Rather than*	Artificial situations
Multiple sources	*Rather than*	One research method

Source: (Denscombe, 1998).

A particularly important strength of a case study approach is that it allows a greater depth of study, which makes it possible to illuminate the general by focussing upon the particular. Therefore, it follows that a case study approach must go into sufficient detail to unravel the complexities of a given situation and to emphasise the detailed working of the processes involved, rather than the actual outcomes. As a result:

> ... case studies tend to be holistic rather than deal with isolated factors... The real value of a case study is that it offers the opportunity to explain why certain outcomes might happen - more than just find out what the outcomes are". (Denscombe, 1998, p.31)

Each case study is a 'naturally occurring' phenomenon; it has not been artificially generated specifically for the purpose of the research (Yin, 1994). The final strength of a case study approach is that it allows the researcher to use a variety of sources, a variety of types of data and a variety of research methods, which improves the project's validity (Yin, 1994). Denscombe (1998, p.31) states that a case study approach "not

only allows the use of multiple sources of evidence, it actually invites and encourages the researcher to do so".

5.1.1 Basis for Case Study Areas

The selected case study areas were initially based upon Natural/Character Areas as defined by English Nature (1993) and the former Countryside Commission (1995) (1995), as previously outlined in Section 3.4.2.2. It is suggested that these Areas offer a more effective framework for the planning and achievement of wider countryside objectives across a wide tract of countryside than do administrative boundaries.

5.1.2 Case Study Selection Criteria

The case study approach generally calls for the researcher to make a conscious and explicit choice about which case to select from a large number of possibilities. Denscombe (1998, p.33) states that "this selection needs to be justified"; therefore the following criteria were used to allow the objective selection of the case study areas, from a total of 120 Natural Areas within England:

5.1.2.1 Selection on the Basis of Suitability

Case studies are conventionally of four types (Patton, 1990; Denscombe, 1998). This research has purposefully selected 'extreme' samples to draw attention to unusual occurrences; 'intensity' sampling to select examples of especially good practice; 'typical' cases have been chosen as middle-range examples of the phenomenon under study; whilst 'variety' sampling has been used to illustrate the wide range of conditions and experiences within the chosen cases.

This selection process ensured that each study area varied in terms of habitats and land use and contained a range of biodiversity plans, although, as biodiversity planning is still at a comparatively embryonic stage, the sample was quite constrained. However, subject to practical considerations, cases were consciously selected to display a 'variety' of biodiversity plans at a sufficiently advanced stage to ensure availability of evidence.

5.1.2.2 Selection on a Pragmatic Basis

In addition to their suitability, the case studies were selected by two further pragmatic criteria. Each study area was within a 100-km radius of my workplace to allow 'easy access'. "In the practical world of research, with its limits to time and resources, the selection of cases is quite likely to include a consideration of convenience" (Denscombe, 1998, p.34). Each English Nature team, responsible for each Natural Area within the 100-km radius, was contacted to collect information on their suitability and to assess their 'willingness' to assist in the research project. Denscombe confirms the suitability of this selection procedure:

> Faced with alternatives which are equally suitable, it is reasonable for the researcher to select the ones which involves the least travel, the least expense and the least difficulty when it comes to gaining access. (Denscombe, 1998, p.34)

5.1.3 Establishment of Key Contacts

Key contacts were established in each of the selected study areas. English Nature Conservation Officers were identified as the most suitable key contacts, as the case study areas are based upon the English Nature's 'Natural Area' concept. Early contact with several Conservation Officers had suggested that they were generally enthusiastic about the research subject, identifying with the particular research problem, but were somewhat cautious about the extent of their involvement, owing to their busy work schedules. These key contacts were invaluable, but to allay their concerns, their contribution was limited to:

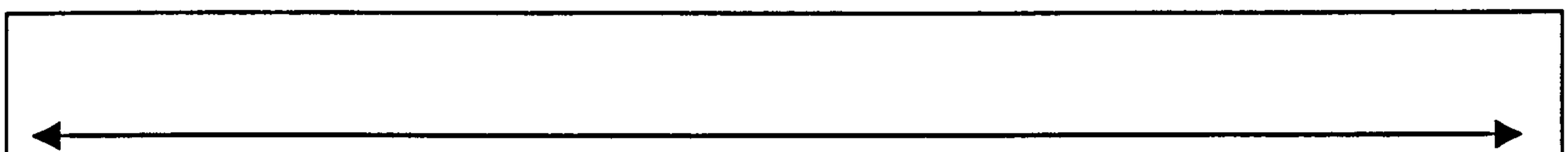
- identification of the relevant biodiversity plans, for use in the content analysis;
- initial identification of key actors involved in the implementation process, to participate in the interview stage of the research;
- piloting the interview framework.

5.1.4 Definition of Wider Countryside Objectives

To define the wider countryside objectives, and further refine the area of study, the research focused upon the conservation of particular habitats within each Natural Area, rather than the area as a whole. This particular approach to the study of

implementation, involving the formal assessment of distinct parts of a programme, has been termed component evaluation by Patton (1997). A particularly attractive feature of component analysis is the potential for greater generalisation of findings. It is suggested (Patton, 1997) that the smaller the unit of analysis, the more homogeneous it will be, and the more homogenous units are, the more likely one can generalise from one unit to another.

The selected habitats represent varying degrees of landscape destruction and modification on the landscape alteration continuum (Figure 5.2), as previously described in Section 3.4.1. McIntyre and Hobbs (1998) suggest that a consideration of the relative degree of habitat destruction and modification will provide a clear starting point for deciding which wider countryside objectives are appropriate.



INTACT	VARIEGATED	FRAGMENTED	RELICTUAL
<10% destroyed Low level of modification	10-40% destroyed Low - high modification	40-90% destroyed Low - high modification	>90% destroyed Mostly high modification

Figure 5.2 - Landscape alteration level continuum

Source: Based on (McIntyre and Hobbs, 1998).

Table 5.2 details the specific wider countryside objectives suggested by McIntyre and Hobbs (1998) for each category of landscape alteration, closely reflecting the key ecological features of the wider countryside as identified within Section 3.3.

Table 5.2 - Wider countryside objectives related to the landscape alteration level

Landscape Ecological Objective	Landscape Alteration Level			
	Intact <10% destroyed Low level of modification	**Variegated** 10-40% destroyed Low - high modification	**Fragmented** 40-90% destroyed Low - high modification	**Relictual** >90% destroyed Mostly high modification
Maintenance	Matrix	Matrix, Patches	Fragments	-
Improvement	-	Connecting / Buffer	Fragments	Fragments
Reconstruction	-	-	Connecting / Buffer	Buffer areas

Source: Based on (McIntyre and Hobbs, 1998).

By way of illustration, the wider countryside objectives for a *relictual/fragmented* landscape, with a high of degree of habitat destruction and modification, would be best served by the creation of corridors and buffer areas along with the effective management of the remaining fragments. In contrast, in a *variegated* landscape, with a low level of habitat destruction and modification, the wider countryside objectives would be to focus on maintaining and improving the remaining extensive habitat areas, rather than the construction of corridors and buffer areas.

5.2 SOURCES OF DATA

Having identified the research objectives for the case studies to address, it was necessary to consider *where* answers to these questions could be found, as well as *how* the answers were best elicited. It is important to make the distinction between sources of data on the one hand, and the methods for generating data from these sources on the other (after Mason, 1996). In the case of this research, two major sources of data provide the necessary answers: the biodiversity plans and the key actors charged with their implementation.

5.2.1 Biodiversity Plans

The research examined a range of biodiversity plans, with a particular focus upon several new initiatives designed to enhance the conservation conditions of the wider countryside, such as LBAPs. As previously outlined in Section 1.3.2, LBAPs are being promoted as an essential means of implementing the UK BAP (UK Government, 1994a). These documents are adopting a more holistic approach, as they pull together existing conservation plans and actions, which share common objectives:

> The purpose of the LBAP is to focus resources to conserve and enhance biodiversity by means of local partnerships... it has, by definition, a shared agenda for conserving and enhancing the biodiversity of an area. (UK Local Issues Advisory Group, 1997b, p.5)

Another important feature of the LBAP is that they actually detail the implementation mechanisms that are necessary for the attainment of the particular biodiversity objectives, together with the organisation responsible for them. This element of the LBAP is of particular interest for this research as it provides a starting point for examining the associated opportunities and barriers affecting the implementation process, thus providing a necessary focus for the subsequent interviews with key actors.

5.2.2 Key Actors

As well as collecting relevant documentation, the target of the case studies is to interview key actors involved in the implementation process of the biodiversity plans. This particular focus on the key actors involved in the implementation process has been termed *process evaluation*, as it seeks to identify the particular strengths and weaknesses of the actual implementation process, rather than the product itself:

> Process evaluation will include perceptions of people close to the program about how things are going... These differing perspectives can provide unique insights into program processes as experienced and understood by different people. (Patton, 1997, p.206)

Indeed, Parsons (1995, p.470) suggested that "effective implementation is a condition which can be built up from knowledge and experience of those in the front line of service delivery".

The selection of key actors was based upon a *purposive sampling* strategy, as this allowed the research to be more focused by identifying those individuals who were most likely to answer the research questions: "individuals are sought who have been involved in that situation" (Robson, 1993, p.241). With a prior knowledge of the conservation process, it was possible to identify many of the key organisations and actors involved in the implementation of the plans. This approach to identify key actors was reinforced by BAPs, which specifically name the organisation charged with the implementation of

certain actions. In addition to those key actors who were defined by role, a small number of others were suggested during the course of the research.

5.3 METHODS OF DATA GENERATION

5.3.1 Content Analysis of Plans for Biodiversity

A content analysis was used to inspect the biodiversity plans in relation to the previously defined wider countryside objectives (Section 5.1.4), to identify the relevant plan objectives and examine the associated implementation actions.

"Content analysis is a research technique for making replicable and valid inferences from data to their context" (Krippendorf, 1980, p.21). In practice this technique allows the researcher to develop inferences by systematically and objectively identifying specific characteristics in selected texts. However, these particular inferences are being developed from a piece of text that was written for quite a different purpose to that of the research exercise. Describing the process of inference, Robson (1993, p.273) draws the distinction between *witting* and *unwitting* evidence: "witting evidence is that which the author intended to impart, whereas, unwitting evidence is everything else that can be gleaned from the document". Tesch (1990) describes the process as one of 'de-contextualising' - taking a piece of text out of the context for which it was originally intended - and 're-contextualising' - placing the text in a new context dictated by the needs of the research exercise.

In terms of this research, the context of the implementation actions, identified within the relevant plans, was to aid the achievement of the plan objectives. The new context for the implementation actions, however, is to indicate possible opportunities and barriers within the actual implementation process. For example, an implementation action describing the need for a detailed habitat survey may indicate a *barrier* associated with a lack of habitat knowledge. By contrast, an implementation action aimed at increasing the targeting of grant aid schemes could be a further economic *opportunity* to fund the restoration of particular habitats. Denscombe (1998, p.169) suggests that "content analysis is at its best when dealing with aspects of communication that tend to be more straightforward, obvious and simple", as in the example above. The more the text relies

on subtle and intricate meanings conveyed by the writer or inferred by the reader, the less valuable content analysis becomes.

The actual process for conducting a content analysis is often described as 'codified common sense' (Robson, 1993, p.275). Content analysis is generally a logical and relatively straightforward procedure that can be adopted to trawl for evidence on a particular phenomenon (Denscombe, 1998). In all, six steps were required to carry out this particular content analysis (after Robson, 1993):

Step 1 - Start with a research question

Initially, the content analysis identified the relevant objectives within a range of biodiversity plans, and assessed their content in relation to the specific case study objective (Objective 3), as previously defined in Section 5.1.4.

Second, the analysis examined the associated implementation actions and, by way of inference, it then defined the *initial* opportunities and barriers to the implementation of plans for biodiversity in the wider countryside (part fulfilment of Objective 4).

Step 2 - Decide on a sampling strategy

The sampling strategy requires the definition of the sampling unit and the description of the sampling *process*. In this case the sampling units, described by Krippendorf (1980, p.57) as "those parts of observed reality or the stream of source language expressions that are regarded as independent of each other", were the individual biodiversity plans in each of the case study areas.

The sampling process was necessary to reduce the task to manageable dimensions by sampling from the population of interest. The importance of a sampling process is reinforced by Krippendorf (1980, p.65): "the social analyst must use some form of sampling plan to make the task executable... Given the universe of possible data, the researcher has to find ways of securing all or obtaining a sample of them" (p.172). In this particular study, the sampling process was defined by the case study selection procedure (Section 5.1.2), and the further definition of the case study objectives (Section 5.1.4). However, given that biodiversity planning is still at a comparatively embryonic stage, the sample of plans was quite constrained and further sampling was unnecessary. As Robson (1993, p.276) states " there may well be situations where the

relevant documents are so rare or difficult to get hold of that sampling in this sense is inappropriate".

Step 3 - Define the recording unit

The recording units, defined by Krippendorf (1980, p.58) as "the separately analysable parts of a sampling unit", were the individual plan objectives, which conveniently break down large biodiversity plans into usable pieces of text, according to key habitats and species.

Step 4 - Construct categories for analysis

The two-stage process of categorisation began with the identification of each biodiversity plan objective (or recording unit), which fulfilled the specific requirements of the case study objective. In practice, if the plan objective met the case study objective it was identified accordingly, and was seen as consistent with the aim of biodiversity planning in the wider countryside. If the plan objective failed to meet the case study objective it was ignored.

By way of illustration, the case study objective for a *relictual* habitat would be to *improve* the remaining habitat *fragments* and to *reconstruct buffer areas*, as detailed in Table 5.2. Therefore, a biodiversity plan objective that details the need to *seek opportunities to re-create the particular habitat, especially where this buffers, extends or links existing sites*, would be seen as consistent with the particular case study objective and identified accordingly.

Once the relevant biodiversity plan objectives were identified, the associated implementation actions, where available, were categorised as 'opportunities' or 'barriers' within Trudgill's (1990) framework, as explained in Section 4.3.1. Trudgill (1990) suggested that to be able to discuss the complexity of implementation logically, it would be useful to group opportunities and barriers, and proposes an initial classification of six major groups: agreement; knowledge; technology; economic; social; and political. As in the example used in Section 5.3.1, an implementation action describing the need for a detailed habitat survey suggests a possible lack of habitat knowledge, and would be categorised as a *knowledge barrier*. Whereas, an implementation action aimed at increasing the targeting of grant aid schemes would be categorised as an *economic opportunity*.

Step 5 - Test the coding on samples of text and assess reliability

An initial pilot study was conducted on a number of biodiversity plans to test the design and reliability of the content analysis process, using the system described previously.

The importance of defining a specific case study objective, to focus upon a particular component of case study, was highlighted by the pilot study. A broad theoretical objective was used for this study, rather than one based on a component of the study area, as the pilot study documents were all concerned with different geographical areas with consequently divergent objectives. As a result the pilot study, which lacked a specific landscape ecological objective (such as those in Table 5.2), identified numerous plan objectives for a whole range of unrelated habitats that were difficult to assess, in terms of meeting the requirements of the overly broad objective.

The study also revealed that many of the plans lacked details of the implementation actions necessary for the attainment of their objectives, which are required to define the *initial* opportunities and barriers. This reinforced the importance of BAPs, which routinely provide details of the necessary implementation actions, as described in Section 5.2.1.

Nevertheless, the pilot study did confirm the usefulness of using the plan objectives as the recording units, and thereby facilitating the rapid identification of objective elements within plans that often contain a great deal of descriptive information. It also confirmed the potential for inferring and categorising a range of opportunities and barriers from the implementation actions, where these existed, within a selection of biodiversity plans.

Step 6 - Carry out the analysis

The content analysis was used to examine the relevant biodiversity plans in each of the selected study areas, as described in the steps above. In summary, the content analysis initially identified the relevant plan objectives, contained within each biodiversity plan, which met the specific case study objective. The analysis then examined the associated implementation actions, and by way of inference, it then defined the *initial* opportunities and barriers to the implementation of plans for biodiversity in the wider countryside. In practice this exercise produced two matrices of results for each study. The initial matrix listed the wider countryside objectives for the case study down one

side, and the individual biodiversity plans were identified along the top. The matrix was then filled with the plan objectives that met the requirements of the case study objectives, as in the example in Table 5.3.

Table 5.3 - Example of content analysis matrix 1

Landscape Ecological Objective	**Biodiversity Plan 1**	**Biodiversity Plan 2**
Maintain habitat patches	**Objective 1** - Ensure no loss of habitat **Objective 2** - Ensure appropriate management of remaining habitat	**Objective 1** - Ensure no habitat loss
Improve habitat connections/buffers	**Objective 3** - Extend habitat patches	**Objective 2** - Establish habitat links and buffers **Objective 3** - Establish links between management and economic diversification

The second matrix listed the associated implementation actions under the previously defined headings (agreement, knowledge, technology, economic, social and political). Alongside each implementation action there was a list of inferred opportunities and barriers. The theoretical example in Table 5.4 illustrates how this looked in practice.

Table 5.4 - Example of content analysis matrix 2

	Implementation Actions for Biodiversity Plan 1	**Opportunity**	**Barrier**
Categories for analysis			
Agreement	**Action 1** - Organise regular meeting for biodiversity partners		Poor communication
	Action 2 - Establish steering group		Lack of co-ordination
Knowledge	**Action 3** - Complete habitat surveys		Inadequate habitat knowledge
	Action 4 - Develop target areas for habitat restoration		Need for indicative planning
Technology	**Action 5** - Research habitat restoration techniques		Lack of established habitat restoration techniques
Economic	**Action 6** - Target grant aid to habitat management	Increased funding for habitat management	

5.3.2 Force Field Analysis Matrix

The identification of the initial opportunities and barriers to the implementation of plans for biodiversity, provided by the content analysis, allowed the construction of a force field analysis matrix. "Force field analysis is an analytical exercise used for priority setting and for selecting and assessing action strategies" (International Council for Local Environmental Initiatives, 1996, p.108). The origin of force field analysis is generally attributed to Kurt Lewin (Lewin, 1951), an experimental social psychologist,

and has been described as "Lewin's unique problem solving tool" (Weisbord, 1987, p.70). Weisbord (1987) describes how Lewin saw unsolved problems frozen in a field of forces, which pushed toward good solutions or away from them, and is well illustrated by a simplified example of a smoker attempting to stop smoking in Figure 5.3. Briefly, the forces driving toward and those restraining problem resolution reach equilibrium, the status quo line, with the arrow length indicating the intensity of the forces. A problem is 'moved' by increasing driving forces or reducing restraining forces.

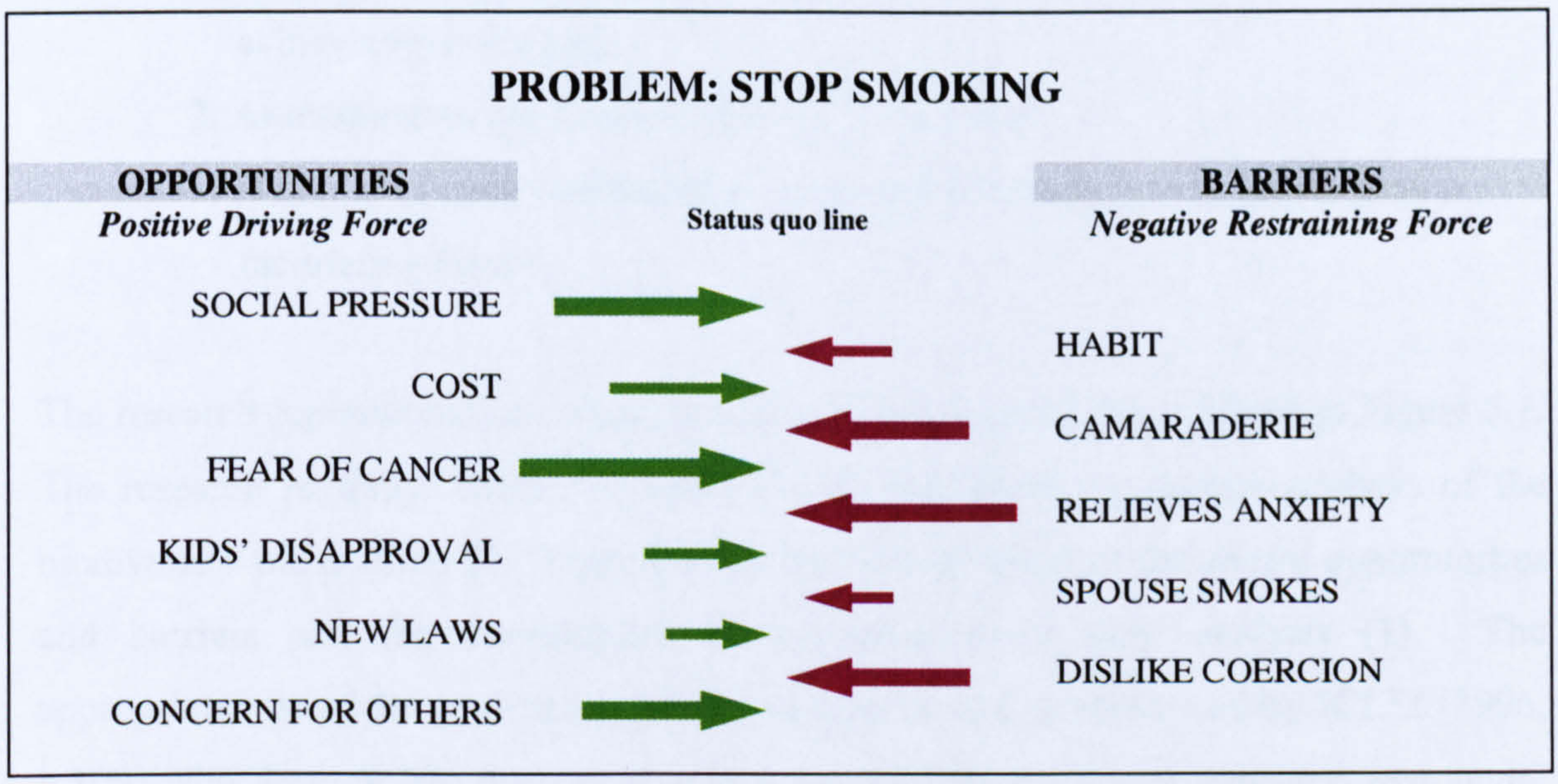


Figure 5.3 - Example of force field analysis matrix

Source: (Weisbord, 1987).

According to Ajimal (1985) force field analysis offers an opportunity of seeing situations as being potentially changeable - if one can identify the forces one can subsequently seek to change their direction or strength. Initiators of change often assume that they have all the relevant information needed to make decisions and that those who will be affected by the change have the same facts, when neither assumption is correct (Kotter and Schlesinger, 1979). Ajimal (1985) suggests that a force field analysis will help to make the options clearer and bring a vague decision into focus. The suitability of using a force field analysis for this study is reinforced by Thomas:

> The concept is widely used in organisation development as a technique for implementing changes... Yet, the use of force field analysis as a means of evaluating strategies and planning their implementation has been overlooked. (Thomas, 1985, p.54)

Force field analysis has also been promoted by the International Council for Local Environmental Initiatives, in their Local Agenda 21 Planning Guide (International Council for Local Environmental Initiatives, 1996), where they see it as rigorous, systematic, comprehensible and accessible to non-experts. In describing the process of conducting a force field analysis, ICLEI (1996) distinguish between three distinct elements:

1. Identification of the specific forces that will either facilitate or hinder achievement of a goal
2. Assessment of the relative strength of each force
3. Planning of action strategies to overcome hindering forces and to promote facilitating forces

The research 'operationalised' these elements using the methods outlined in Figure 5.1. The research partially fulfilled element one by conducting a content analysis of the biodiversity plans (Step 2). This allowed the identification of the *initial* opportunities and barriers and the construction of an initial force field analysis (1). The appropriateness of the content analysis categories is further reinforced by ICLEI (1996, p.109) who describe the need to "create a list of different social, political, economic, and other forces that will either facilitate or hinder the success of each goal or action", closely reflecting Trudgill's (1990) 'barrier' framework.

Step three of the research methodology allowed the completion of the first element, by identifying the *actual* opportunities and barriers through a series of interviews with key actors, based on the initial force field analysis (1). The force field analysis matrix clearly presented the opportunities and barriers, and acted as an effective basis for the further exploration of these through a series of interviews with key actors.

The second element of the force field analysis process was achieved by asking the interviewees to review the case study results and assess the significance of the identified opportunities and barriers (Step 4).

Chapter 10 presents the final element of the force field analysis process, by identifying possible action strategies to overcome hindering forces and to promote facilitating forces.

5.3.3 Interviews with Key Actors

Denscombe suggests it is usually appropriate to use interviews when:

> ... the researcher has reached the decision that... the research would be better served by getting material which provides more of an in-depth insight into the topic, drawing on information provided by fewer informants. (Denscombe, 1998, p.110)

Therefore, the need to examine the 'experiences' and 'perceptions' of the key actors involved in the implementation process is a valid justification for using interviews to gather the necessary information (Denscombe, 1998). In addition, past studies using force field analysis suggest that it is most successfully applied when using groups to identify the issues, as "individual biases and limited information may prevent a single person from evaluating the forces impacting a strategy" (Thomas, 1985, p.58). The interviews were based upon a semi-structured approach. According to Robson, semi-structured interviewers:

> ... have their shopping list of topics and want to get responses to them, but as a matter of tactics they have greater freedom in the sequencing of questions, in their exact wording, and in the amount of time and attention given to different topics. (Robson, 1993, p.237)

A series of interviews, based on a prompt sheet drawn from the draft force field analysis framework, were conducted with key actors involved in the implementation process. These interviews allowed the further exploration of the *initial* forces, identified by the content analysis, and the identification of the *actual* opportunities and barriers (Completion of Objective 4).

A research summary was pre-circulated to each interviewee. This summary introduced the background to biodiversity planning in the wider countryside; the associated problems of implementation; the research aim; and the specific objectives related to each study area. It also briefly described the interview structure. However, the paper did not mention the specific barriers identified by the content analysis, as these might

have led the interviewee and adversely affected the initial 'brainstorming' process. The actual interviews comprised two stages:

Stage 1

- ***Collection of background information*** such as interviewee's position, responsibilities, experience, academic background, to put their comments into context.
- ***Element of 'brainstorming'*** to identify and discuss the interviewee's perception of:
  - Current problems and threats for the selected habitats
  - Opportunities and barriers associated with conserving the selected habitats

Stage 2

- ***Semi - structured discussion***, focused around a force field analysis matrix of opportunities and barriers as identified by the content analysis, with the aim of identifying:
  - Actual opportunities and barriers experienced by key actors
  - Examples, to illustrate each opportunity and barrier
  - Possible cause behind each opportunity and barrier
  - Links between each opportunity and barrier
  - Action strategies to fortify opportunities and overcome barriers

This use of a force field analysis, as an innovative interview framework, was piloted on the key contacts established in each of the case study areas. However, as Robson suggested:

> ... there are aspects of case study research which can make piloting both more difficult to set up and less crucially important... The flexibility of case studies gives you at least some opportunity, as it were, to learn on the job. (Robson, 1993, pp.164-165)

Nevertheless, the key contacts involved in the pilot study were able to identify with many of the forces mentioned, revealing the usefulness of this framework as an aid to structured discussion. They could often state the significance of each opportunity and barrier and suggest possible actions to reinforce or overcome them.

5.4 PRESENTATION AND ANALYSIS OF RESULTS

Approaches to qualitative analysis are notoriously varied and quite often unstructured. Miles (1979) described qualitative data as an 'attractive nuisance', pointing out that the most serious and central difficulty in the use of qualitative data is that methods of analysis are not well formulated. Robson (1993, p.370) also confirmed that "there is no clear and accepted set of conventions for analysis corresponding to those observed with quantitative data". Robson goes on to explain that "many 'qualitative' workers would resist their development, viewing their enterprise as more of an art than a science".

As there is no 'right' way of analysing this kind of data, it places a greater emphasis on being systematic, organised and persevering (Robson, 1993). As a result, Robson (1993) advocated the use of a scientific framework for those who wish to persuade scientific or policy making audiences, suggesting that there are ways in which qualitative data can be dealt with systematically. However, the emphasis on interpretation in dealing with much qualitative data precludes the option of reducing the task to a defined formula. "Qualitative analysis remains much closer to codified common sense than the complexities of statistical analysis of quantitative data" (Robson, 1993, p.374).

The presentation and analysis of the results is as transparent and systematic as possible, being initially structured around the framework of opportunities and barriers provided by the content analysis. It is suggested that the use of such a framework, based on a particular set of propositions, "can be a powerful aid in guiding the analysis, indicating where, and on what, attention should be focussed" (Robson, 1993, pp.377-378).

The systematic framework for the presentation and analysis of results is mapped out in following sections in this chapter. Section 5.4.1 describes the process of preparing the data for analysis, whilst Section 5.4.2 explains the procedures for coding and categorising the data, to identify distinct themes. This information allowed the construction of the case study reports (Section 5.4.3), which were simply a re-writing of the case study results into a descriptive framework. Sections 5.4.4 and 5.4.5 respectively, detail how the results were presented and explain their further analysis.

5.4.1 Preparing Data for Analysis

The researcher can rely on memory to capture the discussion that happened during the interviews. However, Denscombe (1998, p.120) describes how the human memory is a rather unreliable research instrument, which is "prone to partial recall, bias and error, as any psychologist will testify". Therefore, all of the interviews were recorded on audio cassette, which allowed transcription onto a word processor to ensure the accuracy of their content and context.

5.4.2 Coding and Categorising the Data

The actual process of coding involved breaking down the data contained within the interview transcripts into units of analysis and the subsequent categorising of these units (Denscombe, 1998). This was conducted within a software package called NUD.IST, which is an acronym for Non-numerical Unstructured Data Indexing, Searching and Theorising (Qualitative Solutions and Research, 1997). The software package is:

> ... designed to aid users in handling non-numerical and unstructured data in qualitative analysis, by supporting processes of coding data in an index system, searching text or searching patterns of coding and theorising about the data. (Qualitative Solutions and Research, 1997, p.2)

This software allowed the interview transcripts to be managed without oversimplifying their content or losing their complexity and context. The use of NUD.IST allowed the development, and further refinement, of an unlimited number of index categories, each of which was organised in a hierarchical tree structure. Distinct segments of the interview transcripts were indexed and stored within each of the categories, so that all of the relevant data relating to each opportunity or barrier were viewed together. However, "this begs the question which words, ideas or events should be looked for in the data, and which categories should they be put into?" (Denscombe, 1998, p.211). Denscombe (1998) suggested that the researcher could use existing theories, respondent categories or personal/professional hunches to code the data in the first place. For this research the initial, or 'open', coding was based upon the framework of opportunities and barriers provided by the content analysis.

However, the process of open coding is not regarded as crucial at the initial phases, as the units and categorises are subject to a continual process of refinement during the research. A reflection upon these initial codes and categories is a vital element of the

qualitative research process. As a result, an iterative research process was developed where ideas about the research data were tested and interpreted, scanned and refined, until they became coherent and credible (Powney and Watts, 1987). The flexibility of the NUD.IST package allowed the index system, and all of the data within it, to be re-structured as new ideas emerged. This process of reflection on the coding and categorising of the interview transcripts allowed the identification of the actual opportunities and barriers experienced by the interviewees.

5.4.3 Case Study Reports

The opportunities and barriers identified by the coding and categorising process were presented within individual case study reports. These reports entailed a re-writing of all the case study results into a predominantly descriptive framework. The narrative, empirical results of the case studies were largely derived from the research data in a literal sense (Mason, 1996). It is acknowledged that these case study reports are quite extensive documents but as Denscombe (1998, p.175) states:

> Qualitative researchers tend to rely on a detailed and intricate description... to convey the complexity of the situation and to provide the reader with sufficient detail to judge for himself or herself whether the researcher's interpretation of the phenomenon is justifiable and relevant to other circumstances.

Denscombe (1998, p.212) also describes the need for the researcher to "go back to the field with these explanations and themes to check their validity against reality". According to Yin (1994) this review procedure by the interviewees is necessary to test the validity of the project. These reports checked the validity of the identified opportunities and barriers by returning them to all of the interviewees in each case study area. As a result, this process of reflection on the interview data, coupled with checking of these out in the field, allowed the researcher to refine a set of generalisations that explain the themes and relationships identified in the data.

The interviewees also had an opportunity to indicate the significance of each opportunity and barrier, which was necessary for the fulfilment of stage two of the force field analysis process, as described in Section 5.3.2. The scoring system, based upon a summated rating or Likert scale (Robson, 1993), measured the significance of each opportunity (positive score) and barrier (negative score) as perceived by each

interviewee. The scores ranged from 1 to 5; with 1 being a very minor effect; 2 a minor effect; 3 a moderate effect; 4 a significant effect; and 5 a very significant effect.

5.4.4 Presentation of Results

The significance score for each opportunity and barrier, obtained from the interviewees, allowed the construction of a final force field analysis framework. This framework listed the actual opportunities and barriers (Objective 4), along with their mean score, in the form of arrows, as in the example in Figure 5.3. These final frameworks are presented in the following case study chapters, along with a general description of the area; a definition of the area's conservation objectives; the suitability of these objectives; details of the content analyses of biodiversity planning documents; and, finally, a detailed account of each identified opportunity and barrier, supported with evidence from the actual interviews, to complement the final force field analysis framework.

5.4.5 Analysis of Results

The analysis chapter will assess how the identified opportunities and barriers either facilitate or hinder the achievement of the specific landscape ecological objective. In particular, this chapter will investigate the sequence in which the individual opportunities and barriers appear to occur, to highlight key stages in the implementation process. Denscombe (1998) suggests that the original context is an integral part of the qualitative data, as during the process of coding and categorising there is a possibility that the words get taken literally out of context.

The need to understand the various opportunities and barriers in their original context was also expressed by Trudgill (1990). Although Trudgill proposed a list of opportunities and barriers, he suggested that they do not necessarily follow each other in a strict sequence. In describing the need to re-contextualise opportunities and barriers back into the sequence in which they occurred, Trudgill (1990) proposed a systematic sequence for problem solving, as shown in Figure 5.4. Trudgill described how the original categories - agreement, knowledge, technology, economic, social and political - can be nested within this sequence. This sequence allowed critical evaluations at each stage of the process, which either allowed the progression to proceed or, if there was a

The sequence in Figure 5.4 could be applied to this example in the following way: the *problem recognition* may be the increased loss and fragmentation of a particular habitat; the *problem acceptance* recognises the need to further target conservation efforts to reverse this fragmentation process; the *resolution proposal* would, therefore, be to produce an indicative plan. However, the lack of habitat restoration techniques, another problem, prevents the production of the plan and the subsequent resolution of the problem.

CHAPTER 6 CULM CASE STUDY

6.0 CASE STUDY DESCRIPTION

The Culm Natural Area is a 3,500 square kilometre area of north Cornwall, north and central Devon and west Somerset in south west England (Figure 6.1). The area derives its name from the underlying geology of Carboniferous Culm measures, which consist of slates, shales and sandstone (Hughes and Tonkin, 1997; English Nature, 1998).

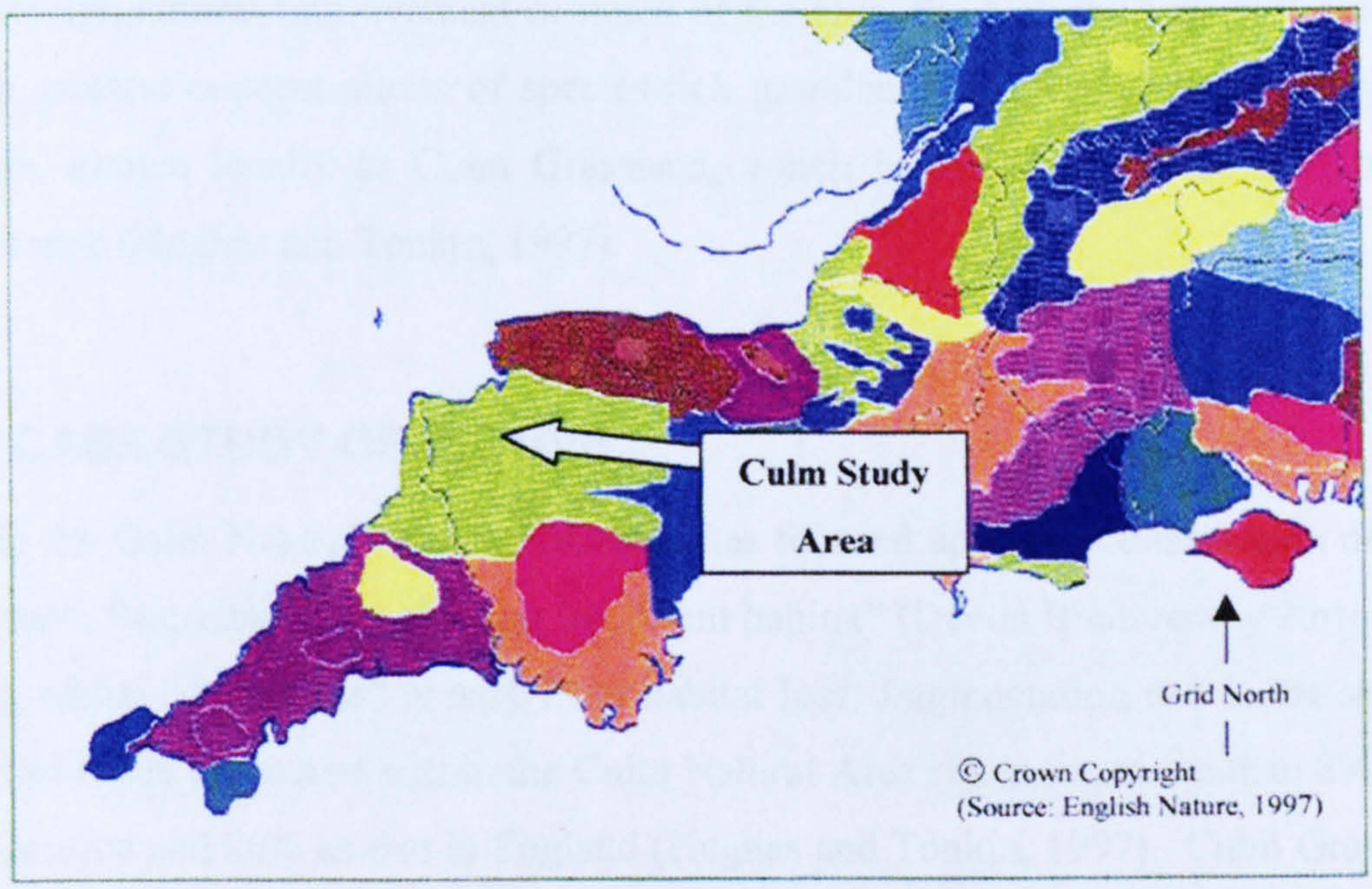


Figure 6.1 - Location of the Culm Study Area within south west England

The Natural Area is characterised by an undulating plateau, between 150 and 250 metres high, which is dissected by the large valleys of the River Taw, Torridge and Tamar, as well as numerous smaller tributary valleys. The agricultural landscape is generally characterised by a patchwork of small fields separated by thick hedgerows and copses. The pattern of human settlement is largely rural with a generally sparse population located in large numbers of farms, hamlets, scattered villages and occasional small towns (Hughes and Tonkin, 1997).

6.0.1 Land Use

The oceanic climate combined with the heavy, acidic, poorly draining soils makes farming difficult, which tends to favour intensive grass production, with dairying, sheep

and beef production being the main land use. These forms of agriculture, together with tourism provide the economic mainstays for the population (English Nature, 1998).

6.0.2 Habitats

The Natural Area supports a high diversity of internationally important habitats, such as ancient oak woodlands, parkland, sea cliffs, maritime heathlands and grassland. In addition, sand dunes, shingle banks and estuarine habitats are of national importance. Despite agricultural improvement of much of the area, the Natural Area still holds one of the greatest concentrations of species-rich grasslands in the UK, particularly Rhôs Pasture, known locally as Culm Grassland, which is considered to be of European importance (Hughes and Tonkin, 1997).

6.1 CASE STUDY OBJECTIVE

Within the Culm Natural Area the research has focused upon the conservation of Culm Grassland, "arguably Devon's most important habitat" (Devon Biodiversity Partnership, 1998), which has suffered greatly from habitat loss, fragmentation and isolation. The extent of Culm Grassland within the Culm Natural Area represents more than 8% of the UK resource and 80% of that in England (Hughes and Tonkin, 1997). Culm Grasslands are:

> defined by wetness - the marriage of a damp climate, mild southerly conditions and saturated, ill-draining acid soils. Where these combine with low-intensity grazing they produce the characteristic mixture of wet heath, rush pasture, fen meadow, mire and scrub, alive with colour and movement in summer, windswept and inhospitable in winter. (Devon Biodiversity Partnership, 1998, p.1 Rhôs Pasture Action Plan)

Culm Grassland occurs throughout the Culm Natural Area, but to allow a greater depth of investigation the research focused upon the conservation of this habitat within the Torridge District, which contains a particularly high concentration. The Torridge District also contains part of the Tamar and Torridge 'Prime Biodiversity Area', which is "intended to highlight and focus conservation attention upon Devon's most important wildlife localities"... in "areas of maximum opportunity where resources may be targeted most effectively to achieve wildlife conservation" (Devon Biodiversity Partnership, 1998, p.38).

6.1.1 Landscape Alteration Level

A survey of Culm Grassland carried out by the Devon Wildlife Trust revealed that between 1984 and 1991, some 65% of the Culm Grassland area present in 1984 and outside of protected areas was lost. 80% of this loss was due to agricultural improvement, the rest due to afforestation, neglect or development (Hughes and Tonkin, 1997; Devon Biodiversity Partnership, 1998). According to Hughes and Tonkin (1997) the Culm Natural Area still contains approximately 4,318 hectares of Culm Grassland, of which 67% is afforded some protection. However, of the 546 separate sites into which this area of Culm habitat is divided, only 38% are protected (Figure 6.2). The protection ranges from statutory designations such as Site of Special Scientific Interest (SSSI), to voluntary agreements such as Countryside Stewardship (CS) and other Environmental Land Management Schemes (ELMS).

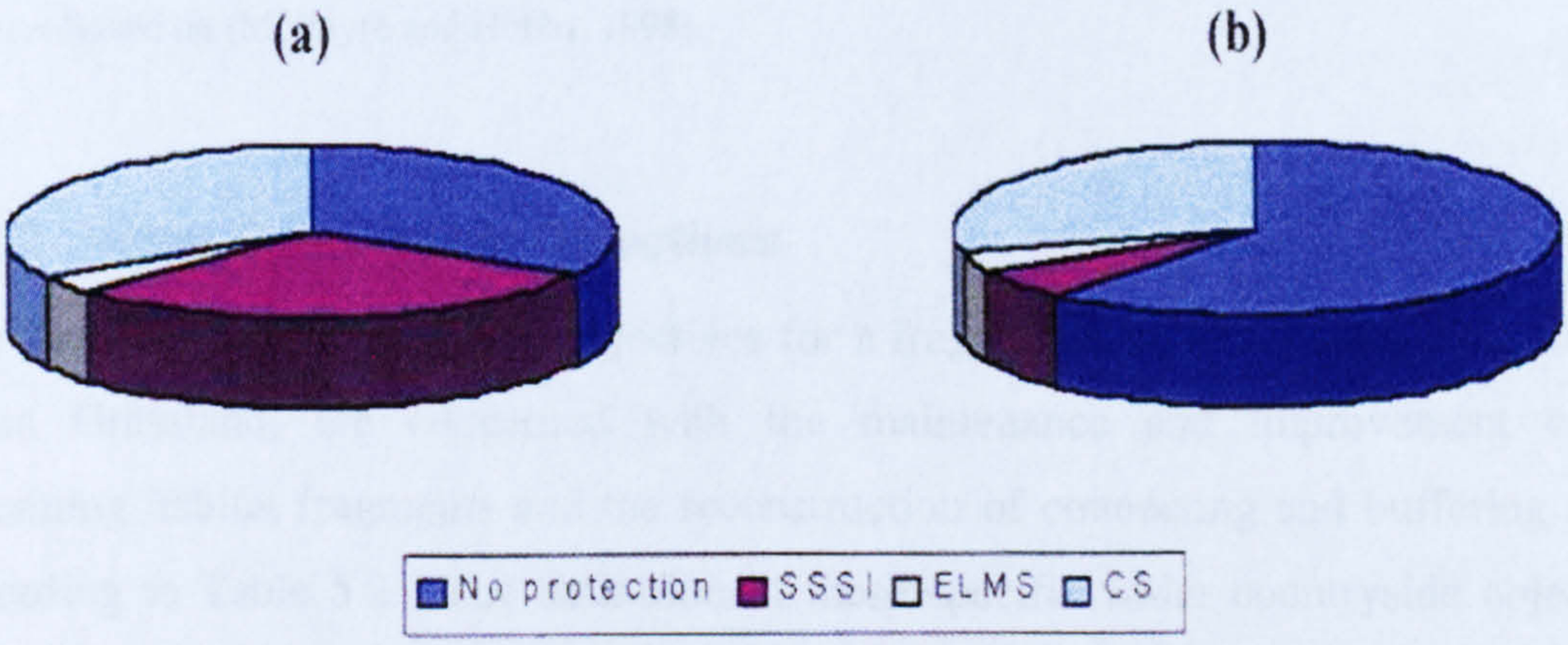


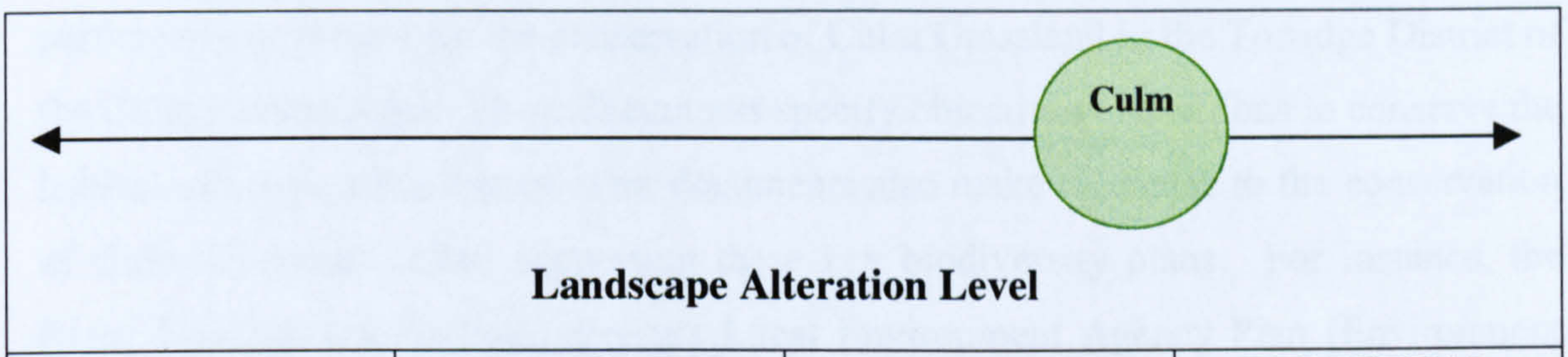
Figure 6.2 - Area of Culm Grassland under some form of protection, by area (a), by site (b)

Source: Data from (Hughes and Tonkin, 1997).

Despite considerable conservation efforts over the past ten years the continued loss, fragmentation and isolation of the existing Culm Grassland sites within the wider countryside remains a primary conservation concern:

> Continued isolation and fragmentation of habitat are significant factors and hence there is a need for additional habitat restoration, extending and linking the remaining sites. (Hughes and Tonkin, 1997, p.31)

From this information it is fair to assume that Culm Grassland represents a fragmented/relictual habitat on the landscape alteration continuum, with a high degree of habitat destruction and modification, as illustrated in Figure 6.3.



INTACT	VARIEGATED	FRAGMENTED	RELICTUAL
<10% destroyed Low level of modification	10-40% destroyed Low - high modification	40-90% destroyed Low - high modification	>90% destroyed Mostly high modification

Figure 6.3 - Culm Case Study area located along the landscape alteration level continuum

Source: Based on (McIntyre and Hobbs, 1998).

6.1.2 Wider Countryside Objectives

The specific wider countryside objectives for a fragmented/relictual landscape, such as Culm Grassland, are concerned with the maintenance and improvement of the remaining habitat fragments and the reconstruction of connecting and buffering areas, according to Table 5.2. The definition of these specific wider countryside objectives provided the necessary focus for the subsequent content analysis.

6.2 SUITABILITY OF CASE STUDY AREA

The Culm Case Study satisfies the selection criteria, as described in Section 5.1.2, in a number of ways: the land use of the area represents a degree of 'typicality'; the focus upon Culm Grassland provides an 'extreme' element in terms of landscape alteration, with the habitat representing a highly fragmented/relictual landscape; whereas the concerted and often innovative conservation strategy focussed upon Culm Grassland and the Torridge District for the past ten years provides an example of good practice.

6.3 CONTENT ANALYSIS OF BIODIVERSITY PLANS

6.3.1 Key Biodiversity Plans

The key contact in the study area identified the following documents as being particularly important for the conservation of Culm Grassland in the Torridge District of the Culm Natural Area. These documents specify objectives and actions to conserve the habitat, although a number of other documents also make reference to the conservation of Culm Grassland, often supporting these key biodiversity plans. For instance, the River Torridge and Hartland Streams Local Environment Agency Plan (Environment Agency, 1998b) details the need to implement actions for Culm Grassland as identified in the Devon BAP (Devon Biodiversity Partnership, 1998), which includes the promotion of management agreements and scrub clearance.

- **The Culm Natural Area Profile**

The Natural Area Profile (Hughes and Tonkin, 1997) describes and evaluates the wildlife of the area, and proposes key nature conservation objectives for discussion. The authors note that the production of this profile is the first step towards securing local agreement on what the priorities for nature conservation are within the Culm Natural Area.

Natural Area Profiles are fully consistent with the UK BAP (UK Government, 1994a). Indeed, English Nature (Hughes and Tonkin, 1997, p.i) "hope that the profile may, through the addition of targets and action points, help with the development of relevant Local Biodiversity Action Plans".

- **The Nature of Devon - A Biodiversity Action Plan**

The Devon BAP (Devon Biodiversity Partnership, 1998) forms a key link in the chain of biodiversity planning running from the National UK Plan (UK Government, 1994a), through regional guidance, to local delivery:

> It is suggested that the Devon BAP offers a means of focussing on what needs to be done for biodiversity in Devon, taking account of both national and local priorities. It is envisaged that the Devon BAP should facilitate and co-ordinate initiatives at County or more local scale, designed to achieve the actions set out in this plan. (Devon Biodiversity Partnership, 1998, p.7 Rhôs Pasture Action Plan)

The importance of the Devon BAP for the conservation of Culm Grassland is also highlighted by the Devon Wildlife Trust, the Action Plan champion:

> If the future of Culm Grassland is to be safeguarded into the next century, a strategic plan is needed which will co-ordinate the efforts of different bodies and landowners. And fortunately a new document called 'The Nature of Devon' contains such a plan. Published in July 1998, its arrival is very timely... and it is very good news for the future conservation of Culm Grassland. (Devon Wildlife Trust, 1998, p.3)

6.3.2 Identification of Relevant Objectives

The key biodiversity plans were examined to assess whether their objectives for Culm Grassland were consistent with the wider countryside objectives (6.1.2), namely, maintenance and improvement of the remaining habitat fragments; and reconstruction of connecting and buffering areas. The results, presented in Table 6.1, clearly confirm that the plan objectives are consistent with wider countryside principles.

Table 6.1 - Key biodiversity plan objectives related to the landscape ecological objectives for Culm Grassland

Landscape Ecological Objectives	*Key Biodiversity Plan Objectives*	
	Culm Natural Area Profile	**Devon Biodiversity Action Plan**
Maintenance of habitat fragments	1. Ensure there is no further loss of Culm Grassland	1. Ensure there is no further loss of Rhôs Pasture within its three major zones
Improvement of habitat fragments	3. Ensure appropriate management of Culm Grassland and associated plant communities	2. Ensure all remaining Rhôs Pasture sites greater than 0.5 hectares are secured under sustainable management regimes, which perpetuate the species they support
Reconstruction of connecting / buffer areas	2. Seek opportunities to re-create Culm Grassland on suitable sites, especially where this buffers, extends or links existing sites	3. Expand the area of Rhôs Pasture by appropriate means, in order to buffer, link and expand existing sites

6.3.3 Definition of Initial Opportunities and Barriers

After the biodiversity plan objectives were confirmed as being consistent with the case study objective, the associated implementation actions were categorised, as opportunities or barriers, under the categories of agreement, knowledge, technology,

economic, social and political. This identification of the *initial* opportunities and barriers to the implementation of the biodiversity plans, provided by the content analysis, allowed the construction of a force field analysis framework (Table 6.2). This framework presented the opportunities and barriers, and acted as an effective basis for the further exploration of these through a series of interviews with key actors.

Table 6.2 - Initial 'opportunities' and 'barriers' identified by content analysis of Culm biodiversity documents

OPPORTUNITIES *Positive Driving Force*		**BARRIERS** *Negative Restraining Force*
	Agreement	
Partnership approach	→	
	←	Poor communication/co-ordination
	Knowledge	
Culm Grassland inventory	→	
	←	Lack of knowledge of habitats/species
	←	Incomplete habitat management knowledge
	Technology	
Indicative planning pilot project	→	
	←	Absence of indicative planning
	←	Lack of established habitat restoration techniques
	Economic	
Application of Countryside Stewardship	→	
	←	Insufficient flexibility/targeting of Countryside Stewardship
Develop initiatives to aid diversification	→	
	←	Lack of funding for mechanism for restoration work
	Social	
Advisor field visits	→	
	←	Limited awareness of site owners
Publications	→	
	←	Limited public awareness
Demonstration sites	→	
	Political	

This analysis clearly demonstrated the importance of the Devon BAP for this research, which established the necessary implementation actions to achieve their conservation objectives for Culm Grassland, but unfortunately this information was lacking from the

Natural Area Profile. However, the implementation actions detailed in the BAP could be seen as consistent with the achievement of the virtually identical objectives presented within the Natural Area Profile. As previously noted, BAPs tend to be more holistic, pulling together existing conservation plans and actions, which share common objectives. This confirms that LBAPs are indeed an essential means of implementing the UK BAP (UK Government, 1994a).

6.4 INTERVIEWS WITH KEY ACTORS

Fourteen interviews were conducted with individuals identified as being actively involved with the conservation of Culm Grassland within the Torridge Area of the Culm Case Study. No particular problems concerning access or co-operation were experienced: on the contrary, the majority of key actors, identified within the study area, empathised with the research subject and were keen to assist. The interviewees represented the following organisations:

- Torridge District Council (1)
- English Nature (2)
- Devon Wildlife Trust (3)
- Devon County Council (1)
- Farming and Rural Conservation Agency (1)
- North Devon Coast and Countryside Service (1)
- Farming and Wildlife Advisory Group (1)
- Institute of Grassland and Environmental Research (1)
- Environment Agency (1)
- South West Forest (1)
- National Farmers Union (1)

Several key actors were able to provide a regional overview of the opportunities and barriers to biodiversity planning, which provided useful results for each of the selected case studies. Therefore, it was unnecessary to re-interview specific organisations/individuals for subsequent case studies.

6.4.1 Coding and Categorising the Interviews

The coding and categorising process produced 41 separate categories, either opportunities or barriers, under the six distinct headings of: Agreement; Knowledge; Technology; Economic; Social and Political, as outlined in Appendix 1. Appendix 1 also contains the NUD.IST coding tree and a list of the individual coding categories.

The results of this coding and categorising process allowed the construction of a case study report, briefly describing each of the actual opportunities and barriers identified from the interview transcripts. It also allowed the construction of a revised force field analysis framework, listing the actual opportunities and barriers to the implementation of biodiversity plans for Culm Grassland conservation within the Torridge District.

6.4.2 Interview Results

These case study reports and revised force field analysis were then returned to each of the interviewees, to review the results and to score the significance of each opportunity and barrier. 79% of the original interviewees reviewed the case study reports and completed the scoring process. The results from the Culm Case Study interviews are presented in the form of a final force field analysis at the end of this chapter (Table 6.3), and each opportunity and barrier is described in the following sections, with a summary of the scoring process in Appendix 2.

6.4.2.1 Agreement

- **Culm partnership approach**

The adoption of a partnership approach is generally considered as one of the most significant opportunities for the conservation of Culm Grassland. It is suggested that the partnership approach is a definite strength that has led to a well co-ordinated conservation strategy, and is indeed necessary to achieve action on the ground.

> I actually think the partnership approach is very important, because the issues in the wider countryside are complex - it demands a collaborative approach to deal with them. These organisations can bring in their different skills and experiences... generally working together to all contribute towards achieving objectives... The bottom line is that it just works working in partnership, whereas, it's just too big a job for one agency to do on their own. (Interviewee 2 - Culm Case Study)

> I think the existing level of partnership is a definite strength and is indeed necessary to achieve the BAP. (Interviewee 3 - Culm Case Study)

> The partnership approach has very definitely paid dividends... in fact it has been one of the best examples in Devon of developing a partnership for the conservation of a terrestrial feature. (Interviewee 7 - Culm Case Study)

- **Poor communication between partners**

Communication does not appear to be a significant issue between the various organisations, with a good system of meetings and working groups:

> I think the main players know roughly what each other is doing, for example, we have regular quarterly liaison meetings between Devon Wildlife Trust, Royal Society for the Protection of Birds, English Nature, Devon County Council and the Environment Agency. That also means that we tend to know what other people, like the North Devon Coast and Countryside Service and the former Farming and Rural Conservation Agency, are doing. Similarly the Environment Agency and English Nature have regular meetings with Ministry of Agriculture, Fisheries and Food and the former Farming and Rural Conservation Agency, so again we know what's going on there. MAFF also hold big meetings where they talk about Countryside Stewardship and Environmentally Sensitive Areas and all the agri-env stuff, with everybody who's active in those fields. (Interviewee 12 - Culm Case Study).

> We have this sort of Culm working group where everybody who could be or should be involved with Culm management and its conservation can get together and meet and discuss problems. (Interviewee 11 - Culm Case Study)

Equally, some stressed the importance of maintaining these communication pathways as the amount of work increases:

> At the moment, because we are at relatively early days of the BAP process; it tends to be focussed upon quite specific projects, with a small number of organisations and a small number of staff and it works well. All I can say is that in the future it is going to remain important to ensure that communication pathways are maintained; clearly that is something that is vital. (Interviewee 2 - Culm Case Study)

- **Poor co-ordination of partners**

Co-ordination of the multiple organisations involved in Culm conservation is critical, to ensure that they are all pulling in the same direction. It was considered particularly important to co-ordinate the efforts of the field officers, with their limited time and resources.

> I would have said our network of organisations is quite good actually. When we're working on a Countryside Stewardship scheme for example, I'll ring around everyone who might have an involvement or an interest to get letters of support, and they're quite good in coming back. (Interviewee 10 - Culm Case Study)

However, there was clearly a concern over the lack of structured co-ordination, suggesting the need for a co-ordination framework:

> I know I'm as guilty of it as they are, but I haven't had any direct contact, even though sometimes we're working on the same sites, which just seems crazy. So that is certainly something we have to improve. (Interviewee 5 - Culm Case Study)

> It would have been nice to have sat down at some stage to discuss mutual interest, considering that we may be going out talking to the same landowner about the same thing... Those offering similar advice need to get together to make sure they're all pulling in the same direction, and I think that hasn't happened, and I think that's been a regret. (Interviewee 9 - Culm Case Study)

> I think one of the other things is that an opportunity has to be found to co-ordinate all the little things that are going on in the countryside, because people are very constrained in a time sense and financially... There needs to be some methodology to allow people to integrate... There's got to be an ability to link schemes up and we're not quite sure what the best way of doing that is. (Interviewee 13 - Culm Case Study)

- **Habitat restoration on forestry sites**

It is suggested that there may be a huge potential for restoring Culm Grassland on forestry sites, as there is a strong correlation between former Culm Grassland sites and present conifer plantations, and the restoration of these sites are fairly straightforward relative to agriculturally improved land.

> There are numerous opportunities for the re-creation of Culm Grassland within the Culm. If you look on an old map for areas of marshy grassland, which is reasonable to assume this it is a habitat we would call Culm Grassland. Then today look on a modern map at the location of conifer plantation; there is a very strong tie between the two. Because conifer plantations do not involve the application of artificial fertilisers, I think there is potential for a huge programme of habitat restoration. (Interviewee 2 - Culm Case Study)

However, there may be significant agreement issues between conservation organisations and the Forestry Commission over the release of forestry land for habitat restoration.

> We've run into problems with the Forestry Commission, as there is a requirement to re-plant under the Woodland Grant Scheme, and so we're in negotiations with them at the moment to try and overcome that problem. (Interviewee 4 - Culm Case Study)

> Because the land was sold with a WGS attached to it, we have to apply to the Forestry Commission to waive that, as part of their commitment to the BAP. We haven't heard yet if they're prepared to do that. (Interviewee 5 - Culm Case Study)

- **Forestry planting on Culm sites**

There is general concern over the planting of trees on semi-improved land, in particular on marginal Culm Grassland sites with a restoration potential, following the recent establishment of the South West Forest Project. In general, though, it is apparent that this concern is related to historical problems and the consultation procedures have improved in recent years:

> Another fairly major threat was planting forestry on Culm Grassland sites, because these areas were seen as very low economic value, so it didn't cost much to buy the land to plant trees on it. The land didn't have to be cleared; you could basically plant the trees straight into the Culm. As a result huge tracts were planted up with conifers mainly, particularly within the Torridge area where there are some very large plantations now. (Interviewee 4 - Culm Case Study)

> A problem used to be one of afforestation, although that is less of problem now and a result of consultation procedures with the Forestry Authority, which ensures that good areas of Culm Grassland are avoided by afforestation. (Interviewee 2 - Culm Case Study)

However, some interviewees still regard there to be a significant threat associated with the planting of trees on marginal Culm Grassland sites:

> The biggest threat at the moment is forestry planting on marginal Culm sites... My biggest worry is the amount of what could revert to very good quality Culm Grassland not being picked up and being put under forestry... If you match the Culm inventory with planting applications there is a definite overlap, which I don't think is being properly addressed. (Interviewee 8 - Culm Case Study)

> The Devon Wildlife Trust work closely with the South West Forest Project to ensure Culm Grassland is taken into account, if they're looking at planting up new areas. I think to a large extent that is definitely working, but I think that perhaps where the conflict lies is where we would perhaps identify a site as having potential for reversion back to Culm, and the forestry people would come out and say well obviously this has got potential for becoming woodland. (Interviewee 4 - Culm Case Study)

It has the potential to affect key marginal sites, which may link important areas and affect metapopulations - that's what I'm concerned about. (Interviewee 5 - Culm Case Study)

I'm not convinced that the SWFP is going to cause massive problems, but it could be a threat for individual isolated sites... by removing opportunities for restoration or re-creation. The sorts of sites that will be targeted for forestry use will be the less productive farmland, so it might be the semi-improved pasture, which could have the potential to revert back to more interesting Culm Grassland. (Interviewee 7 - Culm Case Study)

- **Uncertainty over Torridge Headwaters Project objectives**

There appears to be a possible communication / agreement issues over the objectives of the Torridge Headwaters Project, which has resulted in the loss of funding for the project's third year:

> Our belief is that they've actually misunderstood the objectives; they see it as a duplicate of Countryside Stewardship work, which themselves and the Farming and Wildlife Advisory Group do. They just see it in terms of CS work. (Interviewee 5 - Culm Case Study)

- **Lack of agreement over responsibility to survey the Torridge area**

The particular lack of knowledge of marginal Culm sites in the Torridge area is possibly due to a lack of agreement over responsibility between the Local Authority and conservation organisations. It is suggested that habitat surveys are usually conducted in partnership with District Councils on a district-wide basis.

> The main problem in the Torridge area is that Torridge District Council is not supporting a wider habitat survey, and so that's one reason we're still missing sites... All the other surveys have been done in partnership with English Nature, Environment Agency, but always with the district council... Torridge District Council is saying it is unnecessary because they have their own landscape and conservation assessment; they don't need it. From our point of view, how can a planning authority actually take into account wildlife habitats, which is in their local plan, if they haven't got an inventory of where they are? We have quite a strong difference of opinion with them. (Interviewee 5 - Culm Case Study)

However, Torridge District Council claims that additional surveying is unnecessary as they have their own Landscape and Conservation Assessment. They also point out that agriculture rather than development threatens Culm Grasslands, whereas development pressure has a very limited impact on the conservation of Culm Grassland.

> It is not our responsibility to identify wildlife interest through systematic surveys, and it is not in anyone's best interest really to map the sites that are known on a local plan base, because they don't relate to development pressure... We have had some quite sensitive discussions on this locally, and one gets the uneasy feeling that the conservation organisations see the district council as not fulfilling its responsibilities. (Interviewee 1 - Culm Case Study)

6.4.2.2 Knowledge

- **Culm Grassland Inventory**

The 'Culm Grassland Inventory' provides an extensive record of Culm Grassland sites, and is regarded as a significant opportunity for the Conservation of Culm Grassland.

> We've done a huge amount of work to date... so this is brilliant - this summarises our current state of knowledge of Culm Grassland. (Interviewee 4 - Culm Case Study)

> The Culm Inventory is a fantastic document, and when I show it to people they think it's incredible that we have this information. (Interviewee 9 - Culm Case Study)

Even so, there is concern that the Inventory may still be missing some key sites, even though it is often viewed as a definitive guide, which suggests that if a site is not in the inventory it is not Culm Grassland. There is also concern that some of the inventory information may be old and outdated.

> There's a couple of sites I'm doing Countryside Stewardship for at the moment that actually aren't on the inventory and one of them is an amazing site; it's not a marginal site in any means, it's quite a big area. I don't think the Inventory records of Culm Grassland are quite as extensive as they think they are. (Interviewee 10 - Culm Case Study).

> The inventory is pretty comprehensive, although I wouldn't say it was at the top; obviously it would be great to go out and check all these sites again, because a lot of this information is perhaps 10 years old now. (Interviewee 4 - Culm Case Study)

> Now we're saying it's a flawed tool and we're using that to base a lot of our work on, and that I find very disturbing. (Interviewee 8 - Culm Case Study)

- **Lack of knowledge of marginal sites**

As the Culm Grassland Inventory has emphasised high-quality sites, there is a relatively poor knowledge of marginal Culm sites with a restoration potential.

> The inventory certainly isn't comprehensive in showing all areas that have potential for re-creation, because there would be a lot more on here if that was the case. (Interviewee 4 - Culm Case Study)

The next phase of Culm conservation is to focus on the restoration potential of these marginal sites, to extend, link and buffer existing sites, as the majority of high-quality sites are now in conservation agreements. A sound knowledge of these marginal/restoration sites is necessary to take forward the conservation of Culm Grassland. There may well be substantial areas of unrecognised land, which are ideally suited to habitat restoration, having been only improved slightly.

> The problem is that the survey knowledge has concentrated initially on the best Culm sites, the unimproved sites, and we never really looked at locations of semi-improved sites, sites with potential for enhancement. I think that is a limiting factor now. (Interviewee 7 - Culm Case Study).

> I'm always worried about these marginal sites, where they could go either way, and with re-draining them and a good dose of fertiliser, they would go back to good productive pasture. But by not fertilising and a bit of sympathetic grazing they'd be really species-rich wet meadows, so those are the ones that concern me, always. (Interviewee 8 - Culm Case Study)

- **Limited advisor ability to identify marginal sites**

As the focus for Culm conservation is moving from high-quality sites to marginal sites with a restoration potential, there is some concern about the ability of certain field officers to recognise these marginal habitats. These concerns are obviously exacerbated by the current lack of established restoration techniques, a technological barrier, to confirm what areas could be successfully restored. It was suggested that more specific training in marginal sites and restoration techniques for field officers might be very useful.

> I'm not convinced that he's that hot on what's a good Culm site and what isn't. He's good if it's *Molinia*-dominated but that's very easy. (Interviewee 8 - Culm Case Study)

- **Limited advisor ability to apply Countryside Stewardship to marginal sites**

Coupled with the advisor knowledge of marginal sites is the application of Countryside Stewardship to these sites. There appears to be a degree of uncertainty regarding the areas eligible for entry, suggesting that some very important marginal areas may be left out of CS applications. Once again it was suggested that training may be useful to

demonstrate the application and flexibility of CS to these marginal sites via some case studies, in particular the application of the Special Projects option of CS for innovative approaches to Culm conservation.

> The majority of good Culm Grassland sites are now in Countryside Stewardship agreements, so you're starting to get these marginal areas that are difficult to assess. I think people like myself, and other people doing this work on CS, need proper training on being able to assess what is Culm Grassland and which areas would revert well under management. (Interviewee 10 - Culm Case Study)

> Countryside Stewardship is extremely flexible, but you want to know how flexible, how far you can push it sometimes. It would be quite nice if they could show us actual case studies, some of the ones that maybe a little bit different from normal, to show what you could put in. (Interviewee 10 - Culm Case Study)

- **Limited advisor knowledge of farming systems**

There is concern that some field officers may have a good ecological background but have a limited knowledge of agricultural systems. It is suggested that Culm conservation has to be approached through a viable farming system and that the subsequent conservation advice should reflect this agricultural knowledge.

> I think we have got too many pure ecologists looking at Culm, who don't know anything about farming systems. So they'll say 'oh well, you can just graze it with cows', looking at a site maybe you couldn't get cows into. They don't look at the reality. I don't think it's because they don't want to; it's because they don't have the knowledge. (Interviewee 8 - Culm Case Study)

> Conservation organisations are guilty of employing too many ecologically based people. It's handy to have them, but a lot of them can't talk to farmers, and that can be a major barrier. (Interviewee 8 - Culm Case Study)

- **Limited site monitoring**

Concern was expressed about the limited amount of site monitoring to assess the effectiveness of the strategies to conserve Culm Grassland.

> Sooner or latter someone will say you've spent X million pounds on this. Has it worked: you've got fields with rushes in and you've got fields with *Molinia* in, but can you show me that this work has resulted in a wildlife gain? (Interviewee 2 - Culm Case Study)

- **Incomplete habitat management knowledge**

There appears to be sufficient traditional knowledge regarding the management of Culm Grassland, although there appears to be a need to understand more about the effect of burning and managing restored sites.

> Culm grassland has been managed for centuries. The wildlife has survived either because of, or sometimes no doubt in spite of, that management. Nevertheless we can be confident that if we continue with that traditional management then the special wildlife, that we value so much, will also continue to exist if not necessarily thrive. (Interviewee 3 - Culm Case Study)

> We know how to manage Culm Grassland... But we may need to work more on two specific areas: the management for specific invertebrate species... particularly the effects of burning; and the management of restoration sites. (Interviewee 2 - Culm Case Study)

> I'm still not sure if anybody's quite sure the best time for burning and different people will be offering different advice. I think there is still an issue over winter grazing. Countryside Stewardship would appear to not be in to winter grazing, but I suspect that traditionally there would have been more winter grazing done. (Interviewee 9 - Culm Case Study)

Some respondents implied a need to research the most effective ways of achieving Culm management within a context of agricultural change. In the light of the preceding viewpoint, research might well aim to incorporate modern scientific knowledge with traditional tacit knowledge.

> Management for nature conservation will be very largely the management that has taken place for the last 50 years, whereas management under the current agricultural climate will be different. (Interviewee 14 - Culm Case Study)

> I think it is very important in terms of management to continue with the developmental side. At the end of the Sustainable Management Systems project...we will have identified possible systems, but we will then need to demonstrate those to farmers and nature conservation organisations. (Interviewee 11 - Culm Case study)

6.4.2.3 Technology

- **Absence of indicative planning**

As the majority of high-quality Culm sites are now in conservation agreements there is a shift towards the restoration potential of marginal sites. As a result there is a possible need to have an indicative plan to indicate areas for future habitat restoration, to extend,

link and buffer existing areas. This useful strategic framework will allow the better targeting of time and resources to make a significant impact and to secure conditions for metapopulation conservation. This type of plan would complement the existing Culm Grassland Inventory in safeguarding distinct areas of land from development/forestry pressure.

> We've come quite a long way in getting quite a lot of Culm Grassland within protective management... So we really ought to build on that and look towards our next phase - looking at the potential for recreating Culm: linking together good sites; looking at watercourses; looking at where there is potential to try and bring Culm back again. (Interviewee 4 - Culm Case Study)

> We're getting to the stage now where we should be actively starting to think about habitat re-creation, particularly for those species like the marsh fritillary which have metapopulations to ensure their long-term existence. (Interviewee 3 - Culm Case Study)

> I think a lot of it is probably now fairly generally accepted that one wants to target areas around existing sites, to connect fragmented sites, and therefore the restoration is very much to identify which ones, within a limited budget, one should go for. (Interviewee 11 - Culm Case Study)

Some, however, advise against the idea of an indicative strategy, which is overly dependent upon the co-operation of individual landowners, suggesting the need to focus upon opportunities as and when they arise.

> At the end of the day you're dealing with individuals and voluntary agreements and the best-laid plans can and are likely to go awry, because the farmers concerned aren't interested. (Interviewee 3 - Culm Case Study)

> I must say I'm not a great one for strategic plans of that sort, because ultimately it comes down to the landowner. But if the strategic plan means targeting resources onto particular areas, then that can be a very effective way of doing it. (Interviewee 9 - Culm Case Study)

> A lot can be achieved in the short term without a strategy, as opportunities arise, but to really make steps forward then a strategy would be needed. (Interviewee 2 - Culm Case Study)

- **Indicative planning pilot project - Torridge Headwaters Project**

The Torridge Headwaters Project is a pilot project to examine the potential for indicative planning by identifying, restoring and expanding Culm sites within a small

trial area. The project is focussing on particular sites outside of existing conservation mechanisms and exploring new funding opportunities.

> The THP is looking at land outside of existing conservation mechanisms, such as Countryside Stewardship and the Wildlife Enhancement Scheme. It's all the bits around the fringes that we've been very keen to promote. (Interviewee 5 - Culm Case Study)

However, it has been suggested that the THP may have produced better results if it was run by several organisations rather than by one. A wider operational involvement with other organisations may have also increased the credibility, appreciation and understanding of the project.

> I think the THP has been quite successful in taking that broader view, but I have reservations about it...The whole way in which the projects are administered...they are seen as conservation projects through a conservation organisation... I think there would have been a value of it being a more local authority based project, it would have given it better public credibility and wider appreciation and understanding of what it was trying to achieve. (Interviewee 7 - Culm Case Study)

- **Lack of established habitat restoration techniques**

It is extremely difficult to restore Culm Grassland on agriculturally improved sites, as there is a significant problem associated with the removal of nutrients, phosphorous in particular. One suggested solution is to remove 85% of the organic mineral layer, but this would be neither economically nor socially attractive. It is suggested that it may be far easier to restore Culm Grassland on forestry sites, as artificial fertilisers are not applied in any quantity, although this raises potential agreement issues.

> The restoration of Culm Grassland is at such an early stage people aren't really even sure if it can be done successfully where the site has been significantly improved... There is research going on at the moment to establish whether it can be done, how it can be done, and what is the most effective in terms of labour and cost. (Interviewee 2 - Culm Case Study)

> The improvement of agricultural land relies on the application of tons and tons of fertiliser, including phosphate, which seems to be the particularly difficult one to remove... This encourages competitive species and reduces overall species diversity... That makes it very difficult to re-create this habitat on agriculturally improved land, without drastic measures such as soil stripping. (Interviewee 2 - Culm Case Study)

There is considerable confidence that, as Culm is a fairly robust, resilient habitat, large areas of marginal Culm can be restored through sympathetic management rather than the application of expensive, sophisticated restoration techniques.

> I don't think we should get too hung up on restoration, in that the Culm Grassland has shown itself to be a remarkably resilient, robust habitat, which if given a favourable regime does show a degree of self-regeneration. (Interviewee 7 - Culm Case Study)

> My own experience suggests that where you have sites which have only been partially improved... then just by sympathetic management you can get back a reasonable species diversity probably in the space of a decade or two. I think the picture that some people are painting about the ability to restore Culm Grassland is overly bleak. (Interviewee 3 - Culm Case Study)

- **Habitat restoration pilot projects**

There are several habitat restoration pilot projects being developed to investigate the application of restoration techniques on previously improved land. There is a considerable need for sites to demonstrate that the restoration techniques will actually result in the restoration of semi-improved land to Culm Grassland.

> It's no good just saying 'don't put the fertiliser on and don't do this and don't do that', unless you can see the definite benefits... Farmers want to see it, they want to hear this is what's going on and this is how you do it... If you can say 'in ten years, we expect such and such to happen, or such and such to come back, or your diversity will have gone up by so much'. (Interviewee 9 - Culm Case Study)

These pilot projects are actively promoting restoration work to the farming community through a series of open days. It is hoped that success on these sites will increase the confidence of the farming community, and encourage them to consider the application of associated techniques on suitable areas of land, although there is also a view that the pilot sites will only have a limited value.

> I'm slightly sceptical about the success of some of those projects. I actually think that it is a relatively simple procedure to identify restoration opportunities and target efforts. What I haven't seen demonstrated is how you then restore a seriously degraded Culm site, particularly one with an unfavourable nutrient status. (Interviewee 7 - Culm Case Study)

- **Non-availability of correct grazing livestock**

There is some concern that the current decline in beef farming has reduced the availability of native hardy breeds of beef cattle, which are viewed as very important for the effective grazing of Culm Grassland.

> Another barrier is the availability of the correct types of livestock. Culm grassland is traditionally grazed by hardy breeds of cattle, whereas most farmers now on the Culm either have dairy cattle or the beef cattle they have are of continental breeds, so that's one problem... I look forward to the day when the Culm, as a whole, will be grazed by native breeds of livestock. (Interviewee 3 - Culm Case Study)

> It is a difficult habitat to manage, especially with modern trends to new stocking types; lots of people have got dairy cows. Many farmers have gone from mixed farming to more intensive dairy farming, in a lot of the Culm area, and the cows just aren't up to grazing Culm Grassland. (Interviewee 8 - Culm Case Study)

6.4.2.4 Economic

- **Application of Countryside Stewardship**

The application and uptake of Countryside Stewardship on Culm sites has been very successful, with nearly 70% of the Culm area in some form of conservation agreement. Countryside Stewardship is widely regarded as the most significant opportunity for the conservation of Culm Grassland.

> The experience that we've had on the Culm has shown that one of the main opportunities and incentives to conserve Culm Grassland has been through agricultural support mechanisms, such as Countryside Stewardship... I think it has been responsible for more success than any other measure to date in terms of securing the conservation of Culm Grassland sites. (Interviewee 7 - Culm Case Study)

One view is that it may have reached a 'saturation level' and that it may become increasingly difficult to enter the remaining sites into conservation agreements. The remaining farmers may be unsympathetic to conservation or have the wrong farming system to manage Culm Grassland.

> We're probably approaching the limit, in terms of the number of sites we're likely to secure through that sort of mechanism... For example, it's far more difficult to conserve Culm through a dairying system than it is through a more extensive beef system. So we've probably picked up a high proportion of the farm enterprises with appropriate farming systems, and we've found it

and, under the present system of scoring, sites score more highly if they form part of a cluster of sites, rather than being in isolation.

> The success of the whole conservation strategy has very largely relied on that specific targeting, and if that target were removed then clearly we wouldn't make the significant gains that we have in recent years, so it is an important factor. (Interviewee 7 - Culm Case Study)

> The Torridge Headwaters Project is now recognised within the Culm Countryside Stewardship target area. So that slightly odd-shaped applications can go in, which is brilliant, because that means we've stretched the boundaries of CS a bit. (Interviewee 5 - Culm Case Study)

> Applications already score more highly if they are adjacent to existing Countryside Stewardship agreements. I think in a lot of cases, the successful applications would be ones that are a part of a cluster of Culm Grassland sites. (Interviewee 4 - Culm Case Study)

- **Lack of introductory grant aid scheme**

It was suggested that there may be a need for a lower entry-level grant aid scheme that was quick, less bureaucratic, with lower thresholds and lower payments than existing schemes. An entry-level scheme will give cautious, conservative farmers an opportunity to test it on a small scale. This is particularly important since the demise of the Farm Conservation Grant Scheme and the move to the whole-farm approach for Countryside Stewardship.

> We're looking closely at whether there is scope for an agri-env scheme which has a much lower threshold, lower payments and lower benefits than the things like Wildlife Enhancement Schemes and Countryside Stewardship, which are expensive to run and provide quite decent amounts of money... There would be less demanded of the farmer, the payments would be lower but it would nevertheless help to support the whole grass-based farming economy, which at the moment is under threat. (Interviewee 14 - Culm Case Study)

> I think it would be good if you could come up with some scheme that you focus on a specific area, which was very quick, and was not very bureaucratic, and was basically focussed on one or two fields, instead of whole-farm applications. I know why they do the whole farm thing, because they're trying to maximise value for money, but it puts people off; it's something to consider anyway. (Interviewee 2 - Culm Case Study)

- **Lack of funding mechanism for restoration work**

There is currently no effective funding mechanism to fund the restoration of Culm Grassland sites. Existing funding options in Countryside Stewardship are inadequate to cover the expensive restoration costs, such as the removal of nutrients.

> Because of the problems in farming people just can't afford it, CS provides 50% for the farmer, but they haven't got the extra 50% to put to it, so these things are just being lost to neglect really. (Interviewee 8 - Culm Case Study)

> The incentives under Countryside Stewardship aren't great enough at the moment for the farmers to consider restoration on some areas. For example, a farmer I've been working with has just bought a large old moorland that used to be Culm, but got ploughed quite a few years ago, and the current payments under the CS aren't enough to compensate him being able to cram that site with so many cattle or sheep. (Interviewee 4 - Culm Case Study)

- **Purchase of Culm sites**

The Devon Wildlife Trust has recently purchased a number of established Culm Grassland sites with Heritage Lottery funding.

> I'd say it's fairly crucial to hang on to some of the exceptionally good bits of Culm Grassland... That's something we've been doing a lot recently, particularly through the Heritage Lottery Funding... I think we've got seven Culm Grassland reserves now... which provides a good representation of the different type of Culm communities. (Interviewee 4 - Culm Case Study)

- **Adding value to Culm products**

There is currently a move to bring about a greater recognition of the value of Culm Grassland sites for farmers, by focussing on the production of local, high-quality products in a high-quality landscape. Culm Grassland conservation is reliant on the viability of small-scale extensive livestock farming, raising the possibility that locally distinctive products, such as beef from cattle raised on Culm sites, will have a greater value.

> One of the key things that we should be seeking to do is ensure small-scale farming remains profitable on the Culm, because it is reliant on that whole pattern of farming. If we see the pattern of a smaller and smaller number of larger and larger farms, with more and more intensive systems, then that is directly the opposite of what we need to secure the conservation of Culm Grassland. (Interviewee 7 - Culm Case Study)

> We can try and bring about recognition of greater value of Culm sites for farmers, so that for example beef raised on Culm Grassland has a greater value particularly within the local economy. (Interviewee 4 - Culm Case Study)

> We've got to ensure that the regionally distinctive products that could be marketed from Culm are identified properly: distinctive cheeses, distinctive meat, distinctive wool or whatever. We have missed opportunities or, for whatever reason, not exploited them. (Interviewee 11 - Culm Case Study)

Conversely, the positive impact of these niche markets may have been overestimated, suggesting that what the market demands is quite different from what Culm farmers can deliver.

> I'm somewhat pessimistic about this niche angle... if you look at what the market is demanding, there doesn't seem to be much scope at the moment for extensively reared, very slowly maturing cattle; there is a niche market but it's small... I think it's very limited. I think it is overestimated by conservation organisations. Everyone supports the environment but actually in terms of paying an extra 20p a kilo or whatever it is for their mince or their steak, I doubt it. (Interviewee 14 - Culm Case Study)

- **Funding of joint projects**

A number of Culm projects receive financial support from a range of organisations: for instance, The Torridge Headwaters Project receives funding from both English Nature and the Environment Agency.

> We do very little work directly ourselves; we are mainly involved as a collaborative partner or a funder... For about 4 years we have contributed to Culm Grassland conservation directly by putting money into the Devon Wildlife Trust, both for active projects, such as the Torridge Headwaters Project, and the production of the newsletter 'Culm Connections'. (Interviewee 12 - Culm Case Study)

> We co-finance the Torridge Headwaters Project to a significant degree. I think we're third funders of that. (Interviewee 2 - Culm Case Study)

6.4.2.5 Social

- **Advisor field visits**

Advisor field visits play an important role in conveying management knowledge, securing conservation agreements and raising the awareness of the farming community, but these important field officers have very limited time and resources and are unable to visit all interested parties.

Individual advisors have been one of the things that have made the Culm conservation strategy so successful. It's having the people on the ground providing the advice to individual farmers and landowners. (Interviewee 7 - Culm Case Study)

I have an assistant and between us we could spend all our time going out and seeing people with Culm. To be honest, you've never got enough time to see everybody, to discuss their problems. We are always up against it with staffing. (Interviewee 8 - Culm Case Study)

- **Absence of a 'one-stop shop'**

The multiple involvement in wider countryside conservation, although necessary, may be confusing for many farmers and landowners. Therefore, it was suggested that a 'one-stop shop' or 'countryside clinic' might act as a focal point between the various partners and the farming community, who have unclear perceptions of the various organisations. It may also benefit communication amongst and co-ordination between the Culm partners.

> Reform of the CAP is going to mean that, in many respects, farming becomes more bureaucratic and I think people have called in the past for a one-stop shop grant scheme or one-stop identity. I think there's still, in farmers' minds... rather amorphous, murky organisations and if there was a way, either through the local authority or one organisation being seen as the font of all knowledge, or at least a sign poster, that would help. (Interviewee 4 - Culm Case Study)

One of the other things we're trying to support there is what we call a 'one-stop shop' - a 'countryside clinic' idea, where we'll provide a room, tea and coffee and other facilities, and we'll ask various organisations to actually sit in there. We will book appointments for people, so that say once a quarter, different organisations will be available for a day for farmers. We're in a fairly remote area and farmers aren't going to travel miles to find out some information. The farmers want information closer to the point of need... If people can't get the information we can't expect them to act upon it. (Interviewee 13 - Culm Case Study)

> There have been so many different organisations involved with advising farmers, and telling farmers what grants were available and farmers were getting confused. I think that this has been recognised as a problem and I would hope that it has been resolved. I think that the Farming and Wildlife Advisory Group has done a very good job and that they should perhaps be the one-stop shop for management advice for farmers... Devon Wildlife Trust has also been able to cut through a lot of the bureaucracy and confusion. (Interviewee 11 - Culm Case Study)

- **Publications - Culm Connections**

A newsletter called 'Culm Connections' was introduced in 1994 to raise the awareness of owners and encourage them to enter a conservation agreement. It is based upon the experiences of other Culm farmers, showing owners they are part of a wider Culm 'conservation family'. It also provides a source of further information, advice and contacts.

> We started Culm Connections as a means of trying to keep in touch with all the owners, and to try to encourage farmers who were not in a particular scheme, to think about it by showing them farmers that have gone in. That seems to have been incredibly successful... We've had very positive feedback from a lot of farmers, as well, who say they think it hits the right note and it's not too long, it's colourful and it provides useful information. (Interviewee 4 - Culm Case Study)

> I think what is useful, and what I think it was originally intended for, was just to make people realise that it wasn't just an individual effort that they were involved with to conserve biodiversity on one parcel of land in their land holding. They are part of a Culm Grassland family that is trying to secure the conservation of one of the most important elements of Devon's biodiversity. (Interviewee 7 - Culm Case Study)

- **Limited awareness of marginal site owners**

The awareness of marginal site owners is dependent upon informal, casual contacts at local shows, markets and by the word of mouth, as marginal site owners do not receive the 'Culm Connections' newsletter. The introduction of a 'one-stop shop' may be particularly useful in raising the awareness of these marginal site owners.

> Culm Connections is good, it's very popular, but you only get one if you've got an inventory site, so it's not hitting people with the marginal sites. (Interviewee 8 - Culm Case Study)

> Most farmers that I've come across don't know what it is they've got, they don't know much about it, they just say it's a bit of rough or whatever. I think it's important to build up their knowledge of that, so that there is more understanding and respect... There needs to be more education of farmers of what it is that they're managing, what makes it special, because it doesn't always jump out at you. (Interviewee 9 - Culm Case Study)

- **Best practice demonstration sites**

A number of best practice sites have been established to demonstrate the most effective systems of Culm Grassland management. It is intended that these sites will improve

owner awareness and confidence in the application of these management techniques. They may also aid the building of a consensus on management techniques.

> We need to be able to take people to sites and say 'this is what we've done here and this is what you can get out of it'... For somebody who's trying to run a commercial farm we need to be able show how that conversion fits into the overall agricultural management of the site. (Interviewee 12 - Culm Case Study)

Some farmers and conservationists have criticised the management techniques on these demonstration sites. It was also suggested that the usefulness of these demonstration sites might be quite limited, as they are not widely visited.

> I'm very doubtful that demonstration sites actually have much value; they're not widely visited by farmers... Certainly the people that visit these sites tend to be from nature conservation organisations. Farmers themselves are busy people that are much more responsive to financial incentives. (Interviewee 3 - Culm Case Study)

- **Farm events**

To complement the best practice demonstration sites a series of events is being promoted on working farms, to demonstrate how Culm Grassland fits into a viable farming system and the application of Countryside Stewardship.

> If you could get those farmers that are a bit mocking and tell them what grants are available, the money that can be made through Stewardship... and yet maintain all this wonderful habitat then you might get a few of them to come round to your way of thinking. (Interviewee 10 - Culm Case Study)

> We've had one or two events that have been specifically aimed at farmers, so we encourage them to come to a reserve, or another farm, and it's been great. We had a really good event recently... and we had about 40 farmers turn up from that local area. I think those sort of events have to be quite local, given that the Culm area is so big. (Interviewee 4 - Culm Case Study)

- **Negative owner attitudes**

The Culm is a traditional farming area with 'naturally conservative' farmers, who are not viewed as being industry leaders. As a result there is considerable difficulty in persuading farmers to consider habitat restoration. It is very unlikely that owners will even consider the more drastic habitat restoration techniques, such as the removal of 85% of the organic mineral soil layer.

Individual attitudes is probably a very significant factor, in that conservation will only work if there is sympathy for it, with the landowner or the farmer, although they will be driven to a large extent by economic factors. If they can make their farm profitable without the conservation funding then you are wholly reliant on their attitude. (Interviewee 7 - Culm Case Study)

We find it very difficult to be able to get farmers to look at fairly improved or semi-improved fields and persuade them to consider habitat restoration... They really don't want to see it go back to something wet and marshy which indicates they're bad farmers and they haven't drained their fields properly. (Interviewee 4 - Culm Case Study)

- **Antipathy towards farm advisors**

There appears to be certain degree of antipathy, directed towards conservation organisations, from the farming community.

> Devon farmers typically have a suspicion of people saying 'this is what we want you to do or we'll pay you if you don't do this'. It's their land they want to do with it what they want to do with it, and often they'll do that if they're getting money or not. So if they want to conserve it they'll conserve it, even it costs them money; on the other hand if they want to improve it they'll go ahead and improve it. (Interviewee 12 - Culm Case Study)

> I don't think farmers are suspicious of the Farming and Wildlife Advisory Group, because they're an organisation that was set up by farmers, with the farmers' interest in mind... I think farmers will usually come to us, rather than the Wildlife Trust, which they see as conservationists who don't understand the practicalities for farming. (Interviewee 10 - Culm Case Study)

- **Change in ownership**

There is considerable concern about the structural changes in farm ownership. On the one hand these changes in ownership may lead to intensification, when a larger farm buys a small farm, or where a son or daughter takes over the family farm and needs to maximise income to cover higher financial commitment.

> I think the majority of improvement, which seems to be the biggest threat to me in this area, is where farms have changed hands, or where the sons have taken over. (Interviewee 9 - Culm Case Study)

> At least part of it is as a result of changing ownership: either the farm owner retires, and members of the family take over, or the farm gets sold and the new owner wants to improve agriculturally. (Interviewee 12 - Culm Case Study)

These changes may also lead to neglect, as quite significant areas of Culm are no longer owned or managed by commercial farmers, and without the necessary livestock, land managers have to rely on letting the grass keep.

- **Limited public appreciation & awareness**

Most organisations consider it important to raise the public profile of Culm Grassland; however, these organisations have very limited resources which they tend to focus upon working with framers and landowners - the ones that can directly influence things on the ground.

> I think that is one of the areas where we have not succeeded in the overall conservation strategy for the Culm; we haven't made it an issue of wider public understanding and concern... I think the public just isn't aware of how important this conservation resource is in the Culm, and I think we should certainly aim to make them more aware of that. (Interviewee 7 - Culm Case Study)

Culm Grassland is a fairly difficult habitat to popularise, as it is not a particularly visually attractive habitat. This lack of visual attractiveness may be improved by focussing upon particularly attractive key, characteristic species such as the marsh fritillary butterfly. The promotion of Culm Grassland as a key habitat/feature of the Devon landscape may also benefit the growth in markets for locally produced products.

> It's a really difficult habitat to get people to think about, because for 8 months of the year it's pretty drab. (Interviewee 4 - Culm Case Study)

> It's not necessarily a visually attractive habitat, unless you know a bit about what you're looking for ... It's quite difficult to get that message across... although some of the species are good for raising the public awareness, things like marsh fritillaries. (Interviewee 12 - Culm Case Study)

6.4.2.6 Political

- **Adverse state of agricultural economy**

The low profit margins and downturn in lowland beef and sheep farming have produced a very uncertain future for Culm Grassland, which is largely reliant on the health of the beef sector. The threat is now from the abandonment and neglect of less productive Culm Grassland sites, leading to 'scrubbing up', rather than from agricultural intensification. It is suggested that the last thing farmers want at the moment is to

become involved with risky enterprises such as the management and restoration of Culm Grassland sites.

> The conservation of Culm Grassland is very largely reliant on the health of the beef sector. With current CAP reforms, the big message is, and with the BSE problem we've had, that beef is going to be on its way out. So I can't see that there is a particularly healthy future for the Culm, unless we can find some way of making beef farming profitable. (Interviewee 7 - Culm Case Study)

> I think we are extremely worried that the one sector within agriculture that is facing the most severe and long-term downturn in incomes is the lowland beef and sheep sector. Obviously most of the Culm Grassland would be within that area and the economic viability not only of the area as Culm Grassland, but of the entire farming business is now seriously called into question. (Interviewee 14 - Culm Case Study)

However, the adverse state of the agricultural economy is considered a major opportunity, rather than a barrier, by some.

> The adverse state of the agricultural economy leads to a more positive attitude towards agri-environment schemes, including organic farming. In good times, farmers tend to intensify their efforts to improve their land for food production. (Interviewee 3 - Culm Case Study)

> I think the political climate is very bad. It's a big threat, but at the same time if someone could throw some opportunities at it, because farmers are desperately looking for other alternatives, they're willing to listen. (Interviewee 13 - Culm Case Study)

- **Flax growing on Culm sites**

There is a potential problem of farmers planting flax on Culm sites, in particular on marginal sites.

> Flax growing has been a problem, particularly, since the flax payments were increased to the level they're at now. I think flax has always had a subsidy, but suddenly you meet an awful lot of farmers, or hearing of a lot of farmers who were ploughing up old meadows and growing flax, which really was quite alarming. There was one particularly high-profile case in Cornwall, of an SSSI being ploughed and planted for flax, that hit the papers and it was all quite concerning at the time. (Interviewee 4 - Culm Case Study)

- **Flax growers' protocol**

A flax growers' protocol has been established to tackle the problem of growing flax on sites of wildlife interest, such as Culm Grasslands.

> I think it's fair to say that the flax regime has been identified in the past but again that particular situation has been closed. In the last two years there's been a voluntary agreement, which I think the whole industry supports, that would prevent flax aid being given on land that is of nature conservation interest. (Interviewee 14 - Culm Case Study)

- **BSE 30-month rule**

The BSE crisis has the potential to be a problem for the management of Culm Grassland. As Culm is a fairly unproductive habitat it is very difficult to get stock to a saleable size within the 30-month period, leading to the under-grazing and neglect of some sites.

> Since 1996 farmers have been unable to sell cattle that are over 30 months old into the human food chain and therefore the extensive grazing... which is basically how the Culm has existed in the past... has not been economic. So it is very difficult to make a strong economic case for maintaining Culm Grassland as an agricultural resource. (Interviewee 14 - Culm Case Study)

6.4.2.7 Force Field Analysis of Results

The arrows in the following table represent the significance of each opportunity and barrier, as calculated from the mean scores in Appendix 2. For clarity the thick green and red arrows represent the 'most significant' opportunities and barriers, respectively, with a mean score of 3.5 or greater, whilst the thinner green and red arrows represent the 'less significant' forces with a mean score of under 3.5.

Table 6.3 - Identification of 'opportunities' and 'barriers' affecting the conservation of Culm Grassland in the Torridge District

OPPORTUNITIES *Positive Driving Force*		**BARRIERS** *Negative Restraining Force*
	Agreement	
Culm partnership approach	→	
	←	Poor communication between partners
Habitat restoration on forestry sites	→	
	←	Poor co-ordination of partners
	←	Forestry planting on Culm sites
	←	Uncertainty over THP objectives
	←	Lack of agreement over responsibility to survey Torridge area
	Knowledge	
Culm Grassland inventory	→	
	←	Lack of knowledge of marginal sites
	←	Limited advisor ability to identify marginal sites
	←	Limited advisor ability to apply Countryside Stewardship to marginal sites
	←	Limited advisor knowledge of farming systems
	←	Limited site monitoring
	←	Incomplete habitat management knowledge
	Technology	
Indicative planning pilot project - THP	→	
	←	Absence of indicative planning
Habitat restoration pilot projects	→	
	←	Lack of established habitat restoration techniques
	←	Non-availability of correct grazing livestock
	Economic	
Application of Countryside Stewardship	→	
	←	Competition for Countryside Stewardship
Purchase of Culm sites by DWT	→	

	←	Insufficient targeting of Countryside Stewardship
Adding value to Culm products	→	
	←	Lack of introductory grant aid scheme
Funding of joint projects	→	
	←	Lack of funding mechanism for restoration work
Social		
Advisor field visits	→	
	←	Absence of a 'one-stop shop'
Publications - Culm Connections	→	
	←	Limited awareness of marginal site owners
Best practice demonstration sites	→	
	←	Negative owner attitude
Farm events	→	
	←	Antipathy towards farm advisors
	←	Change in ownership
	←	Limited public appreciation and awareness
Political		
Flax growers' protocol	→	
	←	Adverse state of agricultural economy
	←	Flax growing on Culm sites
	←	BSE 30-month rule

CHAPTER 7 EXMOOR CASE STUDY

7.0 CASE STUDY DESCRIPTION

The Exmoor and the Quantocks Natural Area comprises a 1,350 square kilometre area of north Devon and west Somerset; it also encompasses Exmoor National Park (Figure 7.1).

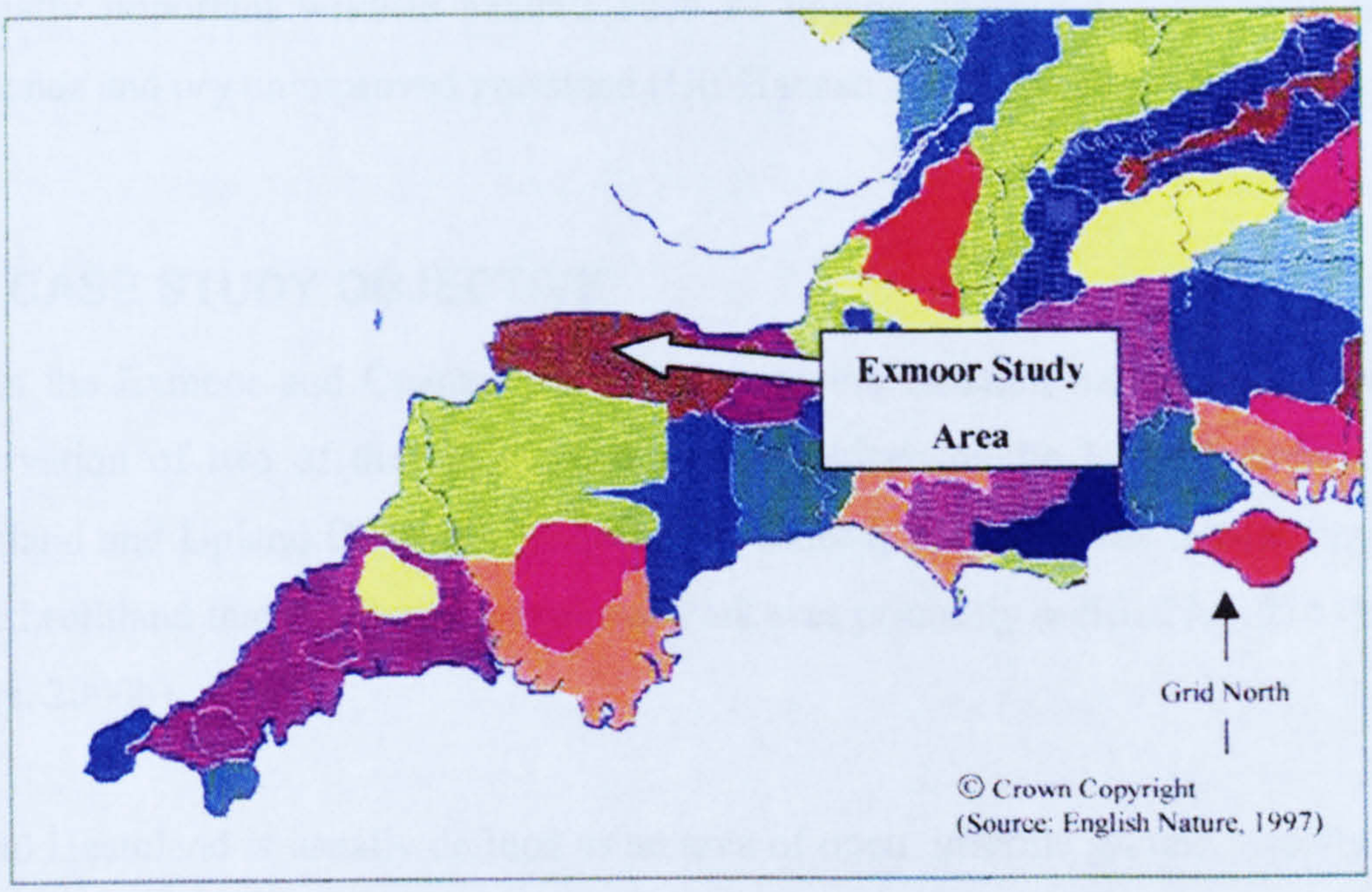


Figure 7.1 - Location of the Exmoor Study Area within south west England

The Natural Area boundary has clear geological and wildlife features that distinguish it from the surrounding countryside. It is marked by the sharper relief of the Devonian sandstone that rises northwards from the rolling Culm Measures (at about 100-130 metres above sea level) up to the moorland plateau of high Exmoor at over 400 metres (Ulf-Hansen and Boyce, 1998). The agricultural landscape is characterised by a central high, treeless area of heather and grass moorland, which is dissected by steep-sided, wooded, river valleys and fringed by enclosed grassland fields surrounded by beech-topped hedgebanks. The human settlements are generally associated with the lower ground, with villages and farmsteads commonly nestled in the sheltered valley bottoms.

7.0.1 Land Use

The main farming systems on Exmoor can be described as (i) true hill farming with rough moorland grazing, with livestock usually consisting of sheep and cattle; and (ii)

upland livestock farming, with mainly beef and sheep on improved grassland (Ministry of Agriculture, 1995). These systems of agriculture, together with forestry and tourism, provide the economic mainstays for the population.

7.0.2 Habitats

The Natural Area supports a considerable diversity of internationally, nationally and regionally important wildlife habitats such as upland heathland, oakwoods, marshy grasslands and dry unimproved grassland (Ulf-Hansen and Boyce, 1998).

7.1 CASE STUDY OBJECTIVE

Within the Exmoor and Quantocks Natural Area the research has focussed upon the conservation of two of the most characteristic habitats of the Natural Area: Upland Heathland and Upland Oakwood on Exmoor. Indeed, it was for the outstanding value of the heathland that the Exmoor National Park was primarily notified in 1954 (English Nature, 2000b).

Upland Heathland is usually defined as an area of open, infertile ground, usually above 250-300 metres, with a vegetation community generally dominated by dwarf shrubs such as heather, gorse and whortleberry (Cordrey, 1997; Exmoor National Park, 1999a).

Exmoor contains approximately 7,000 hectares of this internationally rare community, for which Britain holds a major part of the world resource. Despite this, there have been major losses of Upland Heathland, and it is suggested (Cordrey, 1997) that Exmoor lost 20% of its Upland Heathland between 1950 and 1980. This loss of Upland Heathland has predominantly been to agricultural reclamation, though there has also been a limited amount of coniferous planting. In addition, considerable degradation of the remaining Upland Heathland has resulted from frequent, uncontrolled burning, overgrazing and under-management.

Upland Oakwood on Exmoor provides some of the most important habitats for wildlife in the region, and are characterised by a predominance of oak, mainly sessile, and birch and occur generally above 200 metres.

Exmoor contains approximately 2,209 hectares of Upland Oakwood, which is considered to be one of the main concentrations within the UK, with some particularly large examples occupying whole valley systems. The distinctiveness of Upland Woodland and lack of such large and intact examples outside the UK is reflected in their recognition as being internationally important (Ulf-Hansen and Boyce, 1998; Exmoor National Park, 1999b). Exmoor has lost 30% of its Upland Oakwood in the past century, with the major reason for loss being felling and subsequent re-planting with conifers. Smaller areas of woodland have been grubbed out and converted to agricultural land (Exmoor National Park, 1999b). Although heavily influenced by humans for thousands of years, they are nonetheless one of the closest habitats to the natural climax vegetation of the uplands.

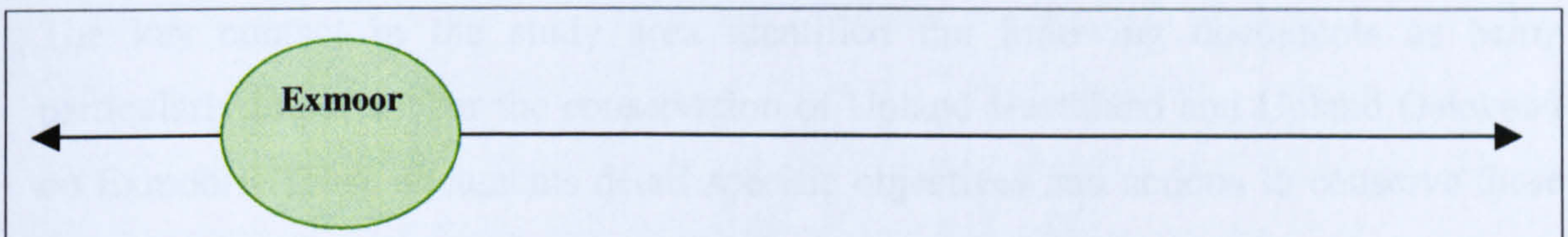
7.1.1 Landscape Alteration Level

The vast majority of Exmoor's Upland Heathlands are notified within the North Exmoor and South Exmoor Sites of Special Scientific Interest (SSSI) and has subsequently been included within the Exmoor Heaths Proposed Special Area of Conservation (pSAC). In addition, almost 30% of the total Upland Heathland resource is either owned or managed by conservation organisations, with conservation being one of their primary objectives (Exmoor National Park, 1999a). Approximately 50% of the total Upland Heathland resource has been entered into the Exmoor Environmentally Sensitive Area (ESA) scheme, which includes prescriptions for the positive management of Upland Heathland and also a provision for its re-creation.

Almost half of the Upland Oakwood on Exmoor is notified within seven large Sites of Special Scientific Interest (SSSI), with all non-SSSI sites over 2 hectares identified as County Wildlife Sites (CWS). In addition, nearly 50% of the total Upland Oakwood resource is either owned or managed by conservation organisations, with conservation being one of their primary objectives. All of the most important blocks of Upland Oakwood are also entered into the Woodland Grant Scheme (WGS) (Exmoor National Park, 1999b).

From this information it is fair to assume that these characteristic Exmoor habitats represent a fairly intact or variegated habitat on the landscape alteration continuum,

with a low degree of habitat destruction and a moderate degree of modification, as illustrated in Figure 7.2.



INTACT	VARIEGATED	FRAGMENTED	RELICTUAL
<10% destroyed Low level of modification	10-40% destroyed Low - high modification	40-90% destroyed Low - high modification	>90% destroyed Mostly high modification

Figure 7.2 - Exmoor Case Study area located along the landscape alteration level continuum

Source: Based on (McIntyre and Hobbs, 1998).

7.1.2 Wider Countryside Objectives

The specific wider countryside objectives for an intact or variegated habitat, such as Upland Heathland and Upland Oakwood on Exmoor, are concerned with the maintenance of the habitat matrix and patches, and the improvement of connecting and buffering areas, according to Table 5.2. These specific wider countryside objectives were subsequently used as a framework for conducting the content analysis.

7.2 SUITABILITY OF CASE STUDY AREA

The Exmoor Case Study satisfies the selection criteria, as described in Section 5.1.2, in a number of ways: the hill farming of the area represents an 'extreme' in terms of land use, which is on the margins of traditional farming practices; the relatively intact nature of the habitats provides the alternative 'extreme', in terms of landscape alteration, as opposed to the Culm Case Study; whereas the highly protected nature of these Exmoor habitats, in terms of ownership, designation and management, provides both a positive 'extreme', when compared to the Culm Case Study, and an element of good practice or 'intensity' sampling.

7.3 CONTENT ANALYSIS OF BIODIVERSITY PLANS

7.3.1 Key Biodiversity Plans

The key contact in the study area identified the following documents as being particularly important for the conservation of Upland Heathland and Upland Oakwood on Exmoor. These documents detail specific objectives and actions to conserve these particular habitats, although a number of other documents also make reference to the conservation of Upland Heathland and Upland Oakwood, often supporting these key biodiversity plans.

- **The Exmoor and the Quantocks Natural Area Profile**

The Natural Area Profile is designed to describe and evaluate the wildlife of the area, and to identify the most meaningful areas of action that need to be taken. Important habitats and species within the Natural Area are identified and described, and objectives set for their conservation (Ulf-Hansen and Boyce, 1998). As previously noted, Natural Area Profiles are fully consistent with the UK BAP (UK Government, 1994a).

- **Action for Biodiversity in the South - West**

This regional action plan was produced to assist in the process of translating the national targets of the UK BAP (UK Government, 1994a) into action at the local level. The South West BAP (Cordrey, 1997) identifies the most important habitats and species within the south west of England, and sets them within a national context, and provides guidance to help ensure a link between local effort and the UK plan.

> The South West Biodiversity Partnership offers these plans in the hope that they will enable local action. In turn this will secure the future for the region's rich biodiversity and ensure that the region plays its full part in implementation of the UK Biodiversity Action Plan. (Cordrey, 1997, p.ii)

- **Exmoor National Park Biodiversity Action Plan**

The first draft of the Exmoor National Park BAP presents a more detailed plan for the conservation of Upland Heathland (Exmoor National Park, 1999a) and Upland Oakwood (Exmoor National Park, 1999b) on Exmoor, than the regional action plan. The plan provides background information on the current status of the habitat, factors affecting it and details of current conservation action. It then defines the objectives and targets for the habitat and the necessary implementation actions to achieve them.

7.3.2 Identification of Relevant Objectives

The key biodiversity plans were examined to assess whether their objectives for Upland Heathland and Upland Oakwood were consistent with the wider countryside objectives for the study area (7.1.2), namely maintenance of the habitat matrix and patches, and the improvement of connecting and buffering areas. The results, presented in Table 7.1, clearly confirm that the plan objectives were consistent with wider countryside principles.

Table 7.1 - Key biodiversity plan objectives related to the landscape ecological objectives for Upland Heathland and Upland Oakwood on Exmoor

Landscape Ecological Objectives	*Key Biodiversity Plan Objectives*		
	Exmoor & Quantock Natural Area Profile	**South - West Biodiversity Action Plan**	**Exmoor National Park Biodiversity Action Plan**
Maintenance of habitat matrix and patches		***Upland Heathland***	
	1. Introduce management practices aimed at extending Heathland vegetation	1. Maintain condition and extent of high-quality Upland Heathland	1. Maintain all existing high-quality Upland Heathland in favourable condition
	2. Manage Heathland to promote a full range of species and structural diversity	2. Restore areas of Upland Heathland which are still present in a suppressed condition	2. Restore sub-optimal Upland Heathland to favourable condition
		Upland Oakwood	
	1. Maintain the existing area of Upland Oakwood	1. Ensure that the existing areas of Upland Oakwood are maintained	1. Improve the condition of sub-optimal Upland Oakwood by increasing the area under conservation management
	2. Restore native woodland to ancient woodland previously planted with conifers	2. Improve the condition of Upland Oakwood by increasing the area under conservation management	
Improvement of connecting and buffering areas		***Upland Heathland***	
	7. Restore/re-create Heathland targeting areas where fragmentation has occurred	3. Attempt, where appropriate, small-scale experimental restoration of Upland Heathland	3. Re-create Upland Heathland where it formerly occurred, with an emphasis on linking existing fragments
		Upland Oakwood	
	3. Extend Oakwood in appropriate places by enlarging and linking existing woods	3. Increase the area of Upland Oakwood, avoiding other habitats of nature conservation value	2. Increase the are of Upland Oakwood avoiding other habitats of nature conservation interest

7.3.3 Definition of Initial Opportunities and Barriers

After the biodiversity plan objectives were confirmed as being consistent with the case study objective, the associated implementation actions were categorised, as opportunities or barriers, under the categories of agreement, knowledge, technology, economic, social and political. This identification of the *initial* opportunities and barriers to the implementation of the biodiversity plans, provided by the content analysis, allowed the construction of a force field analysis framework (Table 7.2). This framework presented the opportunities and barriers, and acted as an effective basis for the further exploration of these through a series of interviews with key actors.

Table 7.2 - Initial 'opportunities' and 'barriers' identified by content analysis of Exmoor biodiversity documents

OPPORTUNITIES *Positive Driving Force*		**BARRIERS** *Negative Restraining Force*
	Agreement	
Partnership approach	→	
	←	Poor communication/co-ordination
	Knowledge	
	←	Lack of knowledge of habitats/species
	←	Lack of monitoring
	←	Incomplete habitat management knowledge
	←	Lack of information on spread/impact of beech and bracken
	Technology	
	←	Absence of indicative planning
	←	Lack of established habitat restoration techniques
	Economic	
Ownership by conservation body	→	
	←	Lack of woodland markets
Application of Environmentally Sensitive Area scheme	→	
	Social	
Advisor field visits	→	
	←	Limited awareness of site owners
Information material	→	
	←	Limited public awareness
	Political	
Attachment of environmental conditions to agricultural subsidies	→	

This analysis demonstrated the importance of both the South West and the Exmoor National Park BAP, which set out the necessary implementation actions to achieve conservation objectives for Heathland and Oakwood. Unfortunately this information was lacking from the Natural Area Profile. However, the implementation actions detailed in these BAPs could be seen as consistent with the achievement of the virtually identical objectives presented within the Natural Area Profile. BAPs tend to be more

holistic, pulling together existing conservation plans and actions that share common objectives, confirming that BAPs are indeed an essential means of implementing the UK BAP (UK Government, 1994a).

7.4 INTERVIEWS WITH KEY ACTORS

Eight interviews were conducted with individuals identified as being actively involved with the conservation of the selected habitats within the Exmoor Case Study area. Once again, no particular problems concerning access or co-operation were experienced: on the contrary, the majority of key actors, identified within the study area, empathised with the research subject and were keen to assist. The interviewees represented the following organisations:

- Exmoor National Park Authority (2)
- English Nature (1)
- Somerset Wildlife Trust (1)
- Farming and Rural Conservation Agency (1)
- National Trust (1)
- Forestry Commission (1)
- Farmer (1)

7.4.1 Coding and Categorising the Interviews

The coding and categorising process produced 49 separate categories, either opportunities or barriers, under the six distinct headings of: Agreement; Knowledge; Technology; Economic; Social and Political. This process produced coding categories and a NUD.IST coding tree similar to the Culm Case Study, as outlined in Appendix 1.

The results of this coding and categorising process allowed the construction of a case study report, briefly describing each of the actual opportunities and barriers identified from the interview transcripts. It also allowed the construction of a revised force field analysis framework, illustrating the actual opportunities and barriers to the implementation of biodiversity plans for the conservation of Upland Heathland and Upland Oakwood on Exmoor.

7.4.2 Interview Results

These case study reports and revised force field analysis were then returned to each of the interviewees, to review the results and to score the significance of each opportunity and barrier. 75% of the original interviewees reviewed the case study reports and completed the scoring process. The validity of the research was clearly confirmed by a number of interviewees who described the case study report as "a very useful document" (Interviewee 3 - Exmoor Case Study), which was "very interesting and reassuringly familiar - you have clearly picked up the main problems" (Interviewee 4 - Exmoor Case Study). The results from the Exmoor Case Study interviews are presented in the form of a final force field analysis at the end of this chapter (Table 7.3), and each opportunity and barrier is described in the following sections, with a summary of the scoring process in Appendix 3.

7.4.2.1 Agreement

- **Partnership approach**

There appears to be general agreement that the partnership approach in Exmoor conservation is working well, with good relationships between the various organisations. A particular strength of a partnership approach is that it allows the various organisations to bring in their different skills and experience and work towards common objectives..

> Given that there are a lot of organisations involved, I think in fact the liaison is quite good between them, we get together; we exchange ideas; we have meetings to discuss the issues. (Interviewee 1 - Exmoor Case study)

> By working in partnership you tap into the expertise of the individual partners. The wrong way to do this is to become a generalist, which lowers by definition the expertise of the individual. So it's much better to pull all the parts together and you get a result, which is greater than the whole. (Interviewee 7 - Exmoor Case Study)

However, it also emerged that there may be difficulties associated with the particularly high level of involvement in Exmoor conservation.

> It's always very difficult to keep everyone informed and there are a lot of organisations involved on Exmoor, more than most places... and it does make life quite complicated. (Interviewee 5 - Exmoor Case Study)

> Because there are so many people, there is so much potential for problems, particularly if they don't agree. I think we found on the management of moorland, that as many people as you speak to, you've got that many different opinions as to what needs to happen. (Interviewee 4 - Exmoor Case Study)

It was also stressed that the success of the Exmoor partnership was often based upon important key individuals, rather than on any defined structure.

> Whether there are problems depends an awful lot on individuals and whether the individuals get on with each other. I think there are too many of us dabbling and I feel that I'm very lucky on Exmoor because I've got some good folk to work with. It only needs one difficult person in one organisation to make life very, very difficult. As I say I think it works on Exmoor, but it's down to individuals as to whether it works or not, and that's perhaps not how it should be; it perhaps should be better structured so that it doesn't rely solely on individuals getting on. (Interviewee 4 - Exmoor Case Study)

- **Concern over ESA stocking levels**

The Environmentally Sensitive Area (ESA) scheme has had major benefits in terms of preventing the overgrazing of heathland, but there is now concern that the stocking levels may be too low to suppress the grass in certain areas, which may lead to the scrubbing up of some heathland sites.

> I think something we face here is possible under-grazing in the future. We know from the quality of the heather, and from historical records, that the grazing numbers have been fairly stable for many years, but if they decline we're going to get big problems. (Interviewee 6 - Exmoor Case Study)

> I'm actually concerned about the ESA. Whilst it has had benefits in terms of overstocking, I'm worried now that actually our stock numbers might be too low, and that we're getting scrubbing up of some of the heathland. In fact we've had problems with some of the invertebrates that breed on the moor... whereby the ESA was brought in and it actually reduced the grazing so much that the cattle weren't out there creating the niches for the butterflies to breed in. We had quite a battle with MAFF and EN to get a derogation, so that part of the moorland was taken out, and is now termed 'other moorland', which is a lower grade and we're allowed to have the cattle back on there. (Interviewee 6 - Exmoor Case Study)

- **Lack of consensus over heathland burning practices**

There appears to be a lack of consensus about what size of heathland area should be burnt and how often. As a rule, farmers would like to see larger areas burnt more often, whereas conservationists are inclined to prefer smaller areas on a longer cycle, so the

problem is one of finding a compromise. As a result, there is a lot of uncontrolled burning of heathland, and it has become a significant issue on Exmoor.

> The farmers' idea of burning is that you chuck down a match and burn as much as you can, as often as you can; that's the tradition... There's an awful lot of argument about, even amongst the people that advocate burning certain areas, what sort of area you should burn and how frequently. (Interviewee 8 - Exmoor Case Study)

This lack of consensus on burning practices is not helped by the apparent difference of opinion between the conservation organisations, with some being much more hard line, and much more opposed to positive management. The lack of consensus is also inextricably linked to a lack of knowledge of management practices, such as burning.

> We're not opposed to the burning of heathland, but we are opposed to uncontrolled burning. I would say to a certain extent it's not helped by the fact English Nature take a slightly different view than we do; they're much more hard line, and much more opposed to positive management I would say. We have quite a problem between them and ourselves in relation to the management of our own land. (Interviewee 1 - Exmoor Case Study)

> There isn't a consensus amongst all those who are involved, as to what the right way to do things is. It's amazed me, because as a non-specialist, I've been listening to all these experts and trying to find a common path through all their ideas, and it's very difficult... It makes it so easy for farmers just to carry on as they've always done, if they see experts disagreeing. If it was clearly on one side the farmers saying this and on the other side the conservationists saying something different, and they were all saying the same thing... you'd be on a much stronger wicket to actually change attitudes and convince people. (Interviewee 4 - Exmoor Case Study)

> Because of the lack of knowledge we are all having to base our opinions on gut feeling, and probably because we come from slightly different directions our gut feeling is probably to be more interventionist than theirs. The uncertainty would be resolved if we knew more about the impacts of management. I think it's quite a major thing: if you don't know the effect of what you're doing how can you be sure that it's the right thing. (Interviewee 1 - Exmoor Case Study)

- **Lack of agreement over releasing forestry land for heathland restoration**

It has been suggested there is a huge potential for restoring heathland on forestry sites, as there is a strong correlation between former heathland sites and present woodland plantations, and the restoration of these sites is fairly straightforward relative to agriculturally improved land.

> The two biggest blocks of woodland that Forest Enterprise manages on Exmoor are former heathland sites and there is tremendous potential for doing some really good work. (Interviewee 5 - Exmoor Case Study)

However, there may be significant agreement issues between conservation organisations and the Forestry Commission over the release of forestry land for heathland restoration, as these woodlands have considerable economic value. There is also a national policy to increase the area of tree cover, rather than reduce it. As a result the Forestry Commission would require compensatory planting for any woodland removed for heathland restoration.

> One of the areas where there is terrific potential for restoring heathland is where conifers have been planted on heathland sites. There we have a major problem with policy and the Forestry Commission, because they insist that if you want to take the trees off heathland you've got to replace them somewhere else, and finding the somewhere else is a problem. (Interviewee 1 - Exmoor Case Study)

> We are also having a huge fight with Forest Enterprise, who have a new plan for one of their major woodlands on Exmoor. It's a prime site for re-creating heathland; it adjoins two very, very good sites with important species on them.... We want them to leave the top of this plateau unplanted, and they won't do it, because they say they're meeting their targets elsewhere in Dorset and the Brecklands... So there is a major issue there, because the best areas to restore heathland would be to take the conifer plantations off. (Interviewee 1 - Exmoor Case Study)

- **Agreement over who should run the ESA scheme**

It was suggested that Exmoor National Park (ENP) may be better suited to run the Environmentally Sensitive Area (ESA) rather than the former Farming and Rural Conservation Agency (FRCA). This concern does not appear to be shared by the other interviewees who regard it is as only a very minor barrier.

> There is a strong feeling within the National Park that we ought to run the ESA, and that we would be better geared up to run the Scheme than FRCA. We are more locally based, we have all the expertise, we have an archaeologist, a landscape architect, ecologists, a land agent - all that stuff is here and it's right on Exmoor. (Interviewee 1 - Exmoor Case study)

- **Difference of opinion over need for woodland management**

There is a long history of woodland management on Exmoor, and many would like to see a return to these active management practices. However, there appears to be a

difference of opinion regarding the need for active woodland management, with some organisations being more interventionist than others.

> It would be unfair to say we're in 'wild disagreement', but I think there is a definite difference in emphasis... English Nature at the moment have got a very non-interventionist approach...Whereas, personally my feeling, and the feeling of the Exmoor National Park generally, is that we'd like to manage our woods a bit more actively than that. (Interviewee 5 - Exmoor Case Study)

There is an increasingly widespread view that some woodland does not actually need active management. The large-scale commercial management of Exmoor oakwood is often regarded as incompatible with retaining their special features. It is often suggested that the biological significance of certain woods has flourished because of inactivity, and that the general intensification of woodland management is a possible threat. Equally, there is a recognition that some woodland could actually benefit from sustainable small-scale positive management practices.

> There is a woodland initiative that is bringing all these woodlands into management, but from a purely nature conservation point of view I think that the other school of thought is that left to their own devices for long enough, they will probably come good anyway. (Interviewee 3 - Exmoor Case Study)

> We've been quite radical here with Horner Wood, a 900-acre woodland, we're actually looking at. I wouldn't say non-intervention, but very limited intervention. It's got a huge history of management, from coppicing, tan barking, iron smelting, all sorts of things, but the biological significance has really flourished because of inactivity since the beginning of this century. We've decided that, within certain parameters, we're going to do very little in the wood. I know there is concern: people say woods are often in poor quality because they haven't been managed, but I think often that is a very short-term view and actually woods are much more resilient than people realise. (Interviewee 6 - Exmoor Case Study)

- **Lack of agreement over the need for deer fencing**

To receive grant aid for the establishment and expansion of woodlands there is a requirement to erect deer fencing, to ensure the survival of young trees and natural regeneration. The erection of deer fences is an expensive business, and it has been suggested that this requirement may be discouraging the establishment and expansion of woodlands.

> The Forestry Commission is very insistent that there has to be deer fencing everywhere and it isn't always necessary. We are having a huge row with

> them at the moment because we're wanting to develop a new woodland and they said the whole thing has got to be deer fenced, which was going to double the cost. We said that we were actually quite happy to accept a certain amount of losses, but they weren't prepared to accept that. We are now going ahead with the woodland without grant aid. That's all very well for a public authority but no private individual is going to do that. (Interviewee 1 - Exmoor Case Study)

There are a number of organisations that do not regard the erection of deer fences as always necessary, particularly for the expansion of existing woodlands. They stress that deer are a natural element of Exmoor's ecology, and that you do not necessarily need huge amounts of regeneration to sustain a wood.

> The number of deer will provide some threat to oakwoods by restricting regeneration severely. There certainly is regeneration happening in various parts of Exmoor, but in the oakwoods where the deer shelter a lot there isn't very much regeneration. (Interviewee 2 - Exmoor Case Study)

> Deer are responsible for a lot of grazing in the wood, and in the past, they have been responsible for little natural regeneration. But what seems likely is that there have been pulses throughout history, when the numbers have been down. Whether that's through disease or whether they've been heavily culled or not I don't know, but it's probably just given enough boost to the seed source to get a few trees away. It's enough to perpetuate the wood, and maybe that makes us think a little more about how our woods actually work. You don't necessarily need huge amounts of natural regeneration to keep the wood going; it could be quite small. (Interviewee 6 - Exmoor Case Study)

7.4.2.2 Knowledge

- **Lack of knowledge of marginal habitats**

As the existing knowledge base on Exmoor has focussed on the identification of high-quality habitats, there is a relatively poor knowledge of marginal habitats with a restoration potential. A sound knowledge of these marginal habitats is necessary to take forward the conservation of Exmoor habitats.

> We want to not only know where the good heathland is but also where the not so good stuff is - the stuff we're trying to bring back into good condition. We also want to know where the areas are where we might try and re-create heathland, particularly areas that are going to link existing fragments. So it's being a bit more focussed. The whole idea with the BAP process is to focus your attention on the really important issues, and we need to do that with our survey information as well. (Interviewee 5 - Exmoor Case Study)

- **Lack of specific knowledge**

It is recognised that there is a considerable lack of specific knowledge of certain habitats and species knowledge on Exmoor. The lack of specific invertebrate knowledge was highlighted recently by the identification of a major site of a national BAP species.

> I think our knowledge base is actually quite poor really. For heathland we know quite a bit crudely in terms of the extent of different habitats, but we probably don't know the extent of communities, for instance. I think there is quite a lack of knowledge really. (Interviewee 1 - Exmoor Case study)

> In terms of conserving biodiversity knowing more about the invertebrates is essential. The naivety of looking at a few plants and birds has got to change, because that is a very small part of the biodiversity as a whole. (Interviewee 1 - Exmoor Case study)

- **Information not freely available**

There was concern expressed that certain items of information were not freely available to the necessary organisations. For instance, the former Farming and Rural Conservation Agency is unaware of the locations of County Wildlife Sites, and is therefore unable to direct resources and protect them as necessary.

> In processing an ESA agreement we have a very short time to go out to the farm, walk around the farm, and map the land into different categories... We rely very much on information we've got from the Exmoor grassland survey, and any other information we've got, and part of that record ought to be the location of County Wildlife Sites (CWS). Obviously if someone has decided it's good enough to be a CWS, there's something special there. (Interviewee 4 - Exmoor Case Study)

> We do have a problem with the Somerset Wildlife Trust... Their policy is they won't tell us where their wildlife sites are, which I find absolutely unbelievable, considering that the only reason we want to know where they are is so that we can help to protect them. They say this is their knowledge, they've spent money obtaining this information, and if we want it we must pay for it, which is crackers. (Interviewee 4 - Exmoor Case Study)

- **Lack of monitoring**

There is considerable concern about the lack of monitoring of habitat management on Exmoor. Adequate monitoring will provide mileposts to assess the condition of the habitat and guide subsequent management actions.

> Monitoring is something that people have been banging on about since time immemorial, and we still haven't got it right. It is something that always seems to come last, and we always pay lip service to it, but we're no better

> than anyone else at actually getting it done. It's expensive and time consuming, but you really do need to do it if you're going to demonstrate that you're actually spending money in an efficient manner. (Interviewee 5 - Exmoor Case Study)

> When you look at the amounts of money involved, the amount of money that's going into conservation agreements, what it would actually cost for an adequate level of monitoring, it just makes sense to do that, to make sure all the other money is being spent wisely. (Interviewee 3 - Exmoor Case Study)

Monitoring will also greatly assist the building of consensus over controversial issues, such as *stocking levels*, *burning practices* and the *impact of active woodland management*.

> If we knew definitively what was right and what was wrong, it wouldn't be so much of an opinion between English Nature and me. Because of the lack of knowledge we are all having to base our opinions on gut feeling...The uncertainty would be resolved if we knew more about the impacts of management. I think it's quite a major issue: if you don't know the effect of what you're doing how can you be sure that it's the right thing. Almost inevitably there are going to be clashes of opinion, because everyone has to sail by the seat of their pants. (Interviewee 1 - Exmoor Case Study)

- **Lack of information on the spread of bracken**

There is concern that a lack of information on the spread of bracken will lead to doubts about applying expensive management measures to heathland sites.

> What we don't know, and we haven't had the time to look at, is the extent of bracken spread on heathland... That leads to doubt about applying bracken control, which is a very expensive business, and which needs to be prioritised extremely. The individual problem over an individual common, with not knowing exactly where the bracken is actively spreading, and over what period it's done so, means that it's difficult to target the control. (Interviewee 2 - Exmoor Case Study)

- **Aerial photographs**

Exmoor National Park has a valuable resource of aerial photographs of Exmoor, dating back to the 1970s, which have the potential to be very useful to monitor key changes, such as the spread of bracken. However, they are unable to use them effectively at the moment owing to technical difficulties and they are currently developing a GIS based upon these photographs.

> The aerial photographs of Exmoor are an extremely valuable resource...The problem is that we can't actually utilise them at the moment, and we're in the process of putting resources to get these images scanned, digitised and

> auto corrected, and that is actually beginning to happen. (Interviewee 1 - Exmoor Case Study)

- **Lack of information on the encroachment of beech and rhododendron**

It was also considered important to monitor the encroachment of beech and rhododendron, which can be very invasive in this part of the country, as they are regarded as detrimental to the wildlife interest of Exmoor Oakwood. Therefore, this information is necessary to direct resources and prioritise the most important areas for management.

> In terms of prioritising woodland for beech and rhododendron removal, we have been discussing with the Somerset Environmental Records Centre about updating the existing survey of woodlands, but we haven't yet commissioned anything. It is something that is planned, but it hasn't got off the ground yet, but we recognise it is quite important. (Interviewee 1 - Exmoor Case Study)

7.4.2.3 Technology

- **Development of GIS based on aerial photographs**

The development of a geographical information system (GIS), based upon the aerial photographs of Exmoor, is intended to realise fully their potential as a valuable monitoring resource.

> The aerial photographs give us a resource where we could evaluate the change in things like bracken, but the information isn't terribly accessible at the moment. If we can get a significant amount of this information on to a GIS then measuring change will be much easier. (Interviewee 1 - Exmoor Case Study)

- **Lack of indicative planning**

As the majority of heathland sites are now in conservation management there is a new focus on the restoration potential of marginal sites. As a result there is a possible need to have an indicative plan to indicate areas for future habitat restoration, to extend, link and buffer existing areas. This strategic framework would allow improved targeting of time and resources to make a significant impact, though the success of an indicative plan is dependent on the establishment of successful habitat restoration techniques, which appear to be lacking, and of appropriate funding mechanisms, such as tier 2 of the ESA Scheme.

> I think indicative planning is very important, so we can direct resources and prioritise the most important areas. (Interviewee 1 - Exmoor Case Study)

> It would be a good idea. Even on Exmoor funds are limited and it makes sense to use them in the best way... There has to be a need for some form of indicative planning. (Interviewee 3 - Exmoor Case Study)

> If we had something outlining the areas that we wanted to target, we had the techniques and the money was available, I think we could certainly achieve something. I think particularly at the moment, when times are so hard and people are changing their perception of how they can make money out of their farm, a substantial payment for recreating heathland would be very attractive. (Interviewee 4 - Exmoor Case Study)

Others believe a lot can be achieved in the short term without a strategy, as opportunities arise, especially within a farmed landscape where there is no public control over land use.

> I think it would be useful to have an audit of all sites with potential for restoration, but because each of those sites will come up serendipitously, as to whether they become available or whether the owner is interested...the indicative planning is not going to make much difference. (Interviewee 2 - Exmoor Case Study)

> Having an audit would merely confirm our knowledge and would leave us champing at the bit, waiting 30 years for an owner to die, or to move on, so that that land would come up... So you can have all the strategies you like in a farmed actively managed landscape, but unless that land comes up for sale you haven't got it. (Interviewee 2 - Exmoor Case Study)

There was also a warning that indicative plans could become gospel, with owners feeling potentially blighted by having their land identified within them. It is also suggested that these plans may inadvertently affect land values.

- **Exmoor Trees and Woodland Guide**

The development of the 'Exmoor Trees and Woodland Guide' is an example of an indicative strategy for establishing and managing woodlands. This guide is not based upon an actual map, although it was pointed out that that it would be quite easy to produce a map if we felt it was worthwhile, because it depends very much on where the opportunities are. Unlike heathland there is adequate technical knowledge for creating new native woodlands, although there is a current lack of financial mechanisms to support their establishment.

> We've broken Exmoor down into a whole series of areas and we've indicated in each area the potential for new woodland. We haven't drawn a map for each area, but we've indicated the type of site that would be suitable. We actually felt, until recently when this 'new native woodlands in National Parks' initiative appeared, there was little point in producing a map of the whole area because in a sense it depended very much on where the opportunities were. (Interviewee 1 - Exmoor Case Study)

- **Lack of established heathland habitat restoration techniques**

The current lack of established heathland restoration techniques is considered to be a highly significant issue. Without the restoration knowledge it will be impossible to produce an indicative strategy to target conservation efforts. Heathland restoration is extremely difficult on agriculturally improved sites, as there is a significant problem associated with the removal of nutrients. There are financial mechanisms available for the restoration of heathland under tier 2 of the ESA, although the restoration techniques appear to be lacking.

> There has been very little take up of the ESA scheme to restore heathland; one site is all we know about. That is possibly for two reasons: either the money isn't that attractive enough...or because the methods of restoring that land are not very well known. (Interviewee 2 - Exmoor Case Study)

> I think the restoration of heathland on agriculturally improved land is a major problem because we don't really have the techniques. Restoration of heathland on sites that have been degraded, overgrazed or whatever - I think we do have the techniques, it's merely having the incentives. (Interviewee 1 - Exmoor Case Study)

> Some of the heathland that was reclaimed, ploughed, re-seeded, and fertilised, then it's very, very difficult; we still don't really know how to go about restoring that kind of land. We still don't know how to get things like phosphates back out the soil and make it suitable for heather to start regenerating, so that certainly is an issue. (Interviewee 5 - Exmoor Case Study)

However, there is the perception that there is already a considerable amount of heathland restoration knowledge available, thus pointing to the need to draw together existing work, rather than conduct additional work.

> There's been lots of work done at various times in the last 20-30 years, but as far as I know, it hasn't all been brought together and analysed properly... I'm sure there's other research that's been done at various times by various people, but we don't seem to be any further forward. (Interviewee 8 - Exmoor Case Study)

In contrast to agricultural land, it is suggested that it is far easier to restore heathland on forestry sites, as artificial fertilisers are not applied in any quantity.

> One of the areas where there is terrific potential for restoring heathland is where conifers have been planted on heathland sites. (Interviewee 1 - Exmoor Case Study)

> There is a lot of heathland that could be restored with techniques that are well known from forestry land. (Interviewee 2 - Exmoor Case Study)

This raises potential agreement issues regarding the release of forestry land, in a time when the Forestry Commission is trying to increase the area of woodland cover.

7.4.2.4 Economic

- **Ownership by conservation body**

A lot of Exmoor habitats, particularly heathland and woodland, are in very good condition because they are under the direct ownership and management of conservation bodies, such as Exmoor National Park and the National Trust.

> We always take the view that conservation is actually quite simple in practice: you can either buy a site to secure it in perpetuity; or you can work with others in terms of paying people to do the right thing. (Interviewee 3 - Exmoor Case Study)

> I think you would find that Exmoor heathland is in far better condition than Dartmoor, for various reasons, but including that fact that Exmoor National Park and the National Trust both own large areas of land. (Interviewee 2 - Exmoor Case Study)

- **Application of ESA**

The application of the Environmentally Sensitive Area (ESA) scheme on Exmoor has undoubtedly done an awful lot of good, with a high proportion of heathland now in ESA agreements.

> The opportunities in relation to upland heath are fairly closely linked to the ESA, the whole of Exmoor heathland is covered by ESA, and a reasonable proportion of the heather moorland is now in ESA agreements. (Interviewee 1 - Exmoor Case Study)

> Obviously the ESA scheme is a brilliant opportunity, which has undoubtedly done an awful lot of good... You only have to look at other areas, which

> don't have the benefit of ESA and see how it's going there to realise that it's a huge opportunity. (Interviewee 3 - Exmoor Case Study)

- **ESA reactive rather than proactive**

There is considerable criticism that the ESA scheme is maintaining the norm, rather than proactively restoring Exmoor habitats.

> The incentives in the ESA are probably not sufficient to encourage positive management; as a result the ESA tends to be very much 'hold the line'... At the moment they can pick up their £50 per/ha basically as long as they don't overgraze, but they don't have to actually do any positive management... They don't get rewarded for doing positive things; they get rewarded for not doing negative things. (Interviewee 1 - Exmoor Case Study)

> The Exmoor ESA is a 'disappointing beast' in that it is very unambitious; it's very much 'hold the line'. (Interviewee 1 - Exmoor Case Study)

Even so, many would regard the ESA a success if it helps holds the line, pointing out that a slow and steady decline of the heathlands and other habitats would have probably resulted in the absence of the ESA scheme.

- **ESA payment structure**

As the existing ESA payment system is based upon a profit-foregone basis there can only be small incentive element to encourage proactive work. As a result there is considerable concern that these incentives may be insufficient to encourage more positive work aimed at conserving biodiversity.

> The ESA payment system is effectively by law required to be on a profits foregone basis... there can only be a 20% incentive element and that 20% element isn't enough to get people to change their ways. (Interviewee 4 - Exmoor Case Study)

> This profit-forgone basis of calculation is a terrible straightjacket for actually paying more for what you want; we should be prepared to pay more for positive works. It's too much maintenance of the *status quo* and too little requirement for actual positive management action. (Interviewee 4 - Exmoor Case Study)

Many organisations would like to see a move away from this profit-foregone basis to a more targeted approach towards important habitats.

> There is still quite a big onus on the agreement holders to put in substantial amounts of counterpart funding. It would be nice to see 90-95% grants for

> some of the work that's specifically for biodiversity that doesn't have spin-off benefit for farming operations. (Interviewee 3 - Exmoor Case Study)

> I think the whole basis of payment wants to be changed. We have to decide what we want to achieve on this bit of ground and what payment is necessary to get people to do that. We've got probably too high a payment on some types of land and too low a payment, or too little differential between payments, to actually encourage people to do what we want them to do on the really important land. (Interviewee 4 - Exmoor Case Study)

- **ESA proactive restoration work**

There are proactive elements for heathland restoration under tier 2 of the Environmentally Sensitive Area scheme, although there has only been a very limited take up. It is suggested that the limited financial incentives are probably insufficient to encourage positive management and are responsible for the poor take up. However, others regarded the lack of established restoration techniques to be more important rather than the lack of financial incentives, but the need to conduct further research into habitat restoration techniques is not shared equally.

> I would be quite interested in trying to turn some grassland back into heathland...but I don't think they'd be able to tell me what to do. I'm not quite sure how to get the payment, how would they assess whether I was doing the necessary work. I'm surprised anybody is doing it, if you see what I mean. (Interviewee 8 - Exmoor Case Study)

> If we're talking about heathland re-creation what we desperately need is an example of where it's succeeded on Exmoor...if we can demonstrate it and the payment is there and we can pin-point areas where we think it would succeed... I think it could start a ball rolling. (Interviewee 4 - Exmoor Case Study)

- **Difficulty entering commons into ESA**

It is often difficult to gain agreement between commoners to allow commons to be entered into ESA agreements. However, it is suggested the current agricultural downturn is making it seem more attractive.

> The main areas of heathland that aren't in ESA agreements are the commons... It's cracking the commons that is the main problem, but it looks as if the incentive created by the agricultural downturn is encouraging the commoners to get together and try and get in. (Interviewee 1 - Exmoor Case Study)

- **Lack of flexibility in ESA agreements**

The ESA scheme is often criticised for its lack of flexibility, preventing some farmers from entering the scheme.

> The flexibility issue is an important thing... in the final review they actually made it more flexible...which really answered a lot of the problems farmers were having with their land. People will say 'I'm not going in the ESA, because they won't let me keep my cattle out all year on this particular piece of land'. (Interviewee 8 - Exmoor Case Study)

The recent development of ESA management plans recognises the need to have more flexible, individual, detailed agreements rather than strictly standard prescriptions.

> With the new management plan, which unfortunately only applies to new agreements, we can specify what the grazing should be within that overall limit. We could ask for cattle at a particular time, if we felt that cattle rather than sheep were needed. We can require that there is some gorse control, or scrub control, or bracken control, and we can be more specific about the burning. It makes it a much tighter agreement, which is good. (Interviewee 4 - Exmoor Case Study)

- **Lack of grazing specification in ESA agreements**

There is concern that the ESA scheme does not necessarily encourage the right breed of animal, as there is no premium placed on traditional breeds, which may be hardier and may eat hardier vegetation.

> I think there is a bit more work to do on trying to get the appropriate management, because under tier 1 part 4 of the ESA it doesn't specify what grazing, it just says do not intensify your existing grazing. If your existing grazing is too low, or if it's with the wrong animals, then there's not going to be any benefits from entering the ESA. (Interviewee 2 - Exmoor Case Study)

- **Grassland entered in wrong tier of ESA**

It is suggested that in the early stages of the ESA scheme some important grassland sites were entered into a lower tier than their quality merits. Although not actually heathland, these unimproved and semi-improved grasslands are now some of the most threatened habitats on Exmoor. A recent ESA review recognised this issue by giving agreement holders the option to reclassify their land. However, there is concern that some of these important sites may have been improved or lost before the problem was recognised or acknowledged.

> Another problem I should mention is that there has been some difficulty we've found with the ESA staff putting the grasslands in the wrong tier - I think because they're very understaffed and they have to do this in a terrible hurry. The nice unimproved grasslands are not always in the tier you expect they should be; they could theoretically have been having fertilisers (and what have you) stuck on them. I think that is the most threatened habitat and the one that, I think, we're losing a fair amount of; even the stuff that's left has quite often had fertiliser on it or has been grazed to death. It's a fairly degenerate habitat and there are some very, very interesting species associated with it: a couple of species in our Exmoor BAP are reliant on these dry unimproved grasslands. (Interviewee 5 - Exmoor Case Study)

- **Moving stock from ESA to surrounding land**

As more areas of heathland go into ESA agreements there is growing concern that surrounding semi-improved habitats, outside of the ESA, will be intensified as farmers move their stock from their ESA land to these areas. Nonetheless, it was pointed out that it would only have a limited impact, because these areas under agreement were not originally farmed very intensively.

> I think there are probably problems with the intensification of management of the farmed land outside the moorland. There is some evidence that stocking levels, stocking rates, across Exmoor have gone up after the introduction of the ESA scheme... The ESA scheme is supposed to stop any intensification and reward farmers for maintaining the status quo. Whereas, there's evidence that livestock numbers have crept up during that period. That argues that livestock number are coming off the moorland, and being put on the in-bye land, not being sold, so there's a general intensification of the in-bye land. (Interviewee 2 - Exmoor Case Study)
>
> If people are taking their animals off the moor as part of an ESA agreements, they're not getting rid of them; they're just using their in-bye land more intensively. (Interviewee 5 - Exmoor Case Study)
>
> The areas of land which have gone into ESA agreements, where they've needed to cut right back, I don't think they were areas of land that were farmed that intensively before anyway. (Interviewee 8 - Exmoor Case Study)

- **Lack of labour for the control of burning**

There is currently a lack of the necessary labour to control fires in the way that the conservation organisations would like to see them controlled. It is not part of the tradition on Exmoor to have small frequent fires, and it is suggested that there is a need for greater incentives in the ESA to control heathland burning.

> You need a lot of manpower to control moorland burning effectively. If you've got grouse moor management you're making a good return on the moorland and it's worth your while doing that, but if you're just doing it for

farming then it's just not worth your while to go out with 3 or 4 people to control the fire. (Interviewee 5 - Exmoor Case Study)

There are no practical reasons why they can't manage their moorland in the way that the grouse moors are managed up north, with little burns. But it's not part of their tradition and they don't expect to have to employ the numbers of people to control the fire and cut the fire breaks... I think the compensation they get under the ESA is sufficient to compensate them for the sort of management that we want, but perhaps not sufficient to really force them to change their way of doing things. (Interviewee 4 - Exmoor Case Study)

- **Lack of woodland markets**

The decline of traditional woodland markets, such as tan bark and charcoal, is often criticised as the main factor behind the decline in active woodland management, although there are some encouraging signs for the marketing of woodland products.

> One private individual has set up a company on Exmoor, marketing Exmoor oak to the top of the market for oak flooring and oak panelling, and he's doing very well and that's helping to create markets. So there are some quite encouraging signs in terms of breaking this problem of lack of management and no market and so on. (Interviewee 1 - Exmoor Case Study)

Others, though, doubt that the market for woodland products is such that it can support positive woodland management without the use of grant aid, suggesting that it will always be a niche market.

> You can manage woodlands on a small scale sustainably and benefit biodiversity, but that needs support through the grant system. Whether the market for woodland products is such that it can support that without the grants, I don't think that is true at the moment anyway. (Interviewee 2 - Exmoor Case Study)

- **Exmoor Woodland Project Officer**

The establishment of the Exmoor Woodland Project Officer will assist woodland managers in applying for grant aid and examining ways of marketing their products.

> The main positive incentive for Upland Oakwood is that we have set up a woodland project on Exmoor, funded with European funding. The project officer is going around encouraging the owners to manage the woodlands, helping them fill out forms for WGS, looking for various ways of marketing the products. (Interviewee 1 - Exmoor Case Study)

- **Working Woodlands Project**

The Working Woodlands Project, funded by the EU, provides grants for contractors and owners to buy equipment for woodland management.

- **Woodland grants**

A range of woodland grants, such as the Woodland Grant Scheme, provides financial opportunities to establish and manage woodland. In the future it is suggested that these grants will become more targeted with increased incentives in areas where it is desirable to plant particular woodlands. However, there is concern that the bias towards grants for active management may be encouraging owners to manage woods that should otherwise be left alone.

> I think you'll find the effort through things like WGS will become more targeted. So there may be, for example, reduced incentives in areas where we don't want trees, or the converse might well be true for increasing incentives where we do want trees. (Interviewee 7 - Exmoor Case Study)

> Grants should become available for managing woodland in a very sensitive, small-scale way, rather than attempting to manage all the resource of woodland, which would lead to lack of dead wood and lack of long-term planning. If the grants were biased towards active management then only the people who want to actively manage the woods will go and do it, and they may be either not very many, which means no management gets done, or the grants may encourage them to manage woods that should otherwise be left alone. (Interviewee 2 - Exmoor Case Study)

- **New Native Woodlands in National Parks**

The 'New Native Woodlands in National Parks' challenge fund, as the name suggests, was introduced to encourage the establishment of new native woodlands in national parks, although a lack of funds resulted in the adoption of only one scheme in Exmoor National Park.

> We've got this new native woodland challenge fund; the problem with that is that there's not enough money. We had about 10 applications last year, and only got 1, because the Forestry Commission didn't have the money to really put into practice what they'd like. (Interviewee 5 - Exmoor Case Study)

> What we were so cross about was that fact that we were encouraged to put in lots of good applications, which we did and a lot of energy went in to doing it. Then we only got one token scheme per National Park throughout the country, because they didn't have the funds. (Interviewee 1 - Exmoor Case Study)

- **High cost of deer fencing**

It is suggested that the requirement to erect expensive deer fencing is discouraging the establishment and management of some woodland. There is also a lack of agreement over whether this fencing is always necessary.

> Another issue is the deer population. Certainly if one tries to reintroduce the traditional management of coppicing, that's only viable if your coppice coupes are fenced. For fencing against red deer you're talking about six-foot fences which is an expensive business. Given that the woods that remain are on steep slopes, in fairly inaccessible valleys, you're dealing with a low value product, which is difficult to get out and so on. Current forestry grants are not sufficient to encourage private owners to go into this conservation type management. (Interviewee 1 - Exmoor Case Study)

7.4.2.5 Social

- **Advisor field visits**

Advisory field visits play an important role in conveying management knowledge, securing conservation agreements and raising the awareness of the farming community, but these important field officers have very limited time and resources and are unable to visit all interested parties.

> With the wider countryside we'd go more down the advisory route; you can't buy everything to save it... We don't give whole farm advice, we pick up the non-statutory sites, and FWAG obviously sweep up on the whole farm advice. We slot in alongside FWAG, and obviously we don't touch SSSIs in terms of advice, we leave that to EN. Yes, it's vital; we see this awareness and advisory route as being the right way to go really. (Interviewee 3 - Exmoor Case Study)

> The problem is with FRCA is they're so understaffed. They haven't really got the time. They're relying on people like ourselves to do the work for them in effect, which is difficult because we're pushed as well... Again it's quite often more the issue of the time to go out and do that proactive work that's the problem for the other conservation organisations and us. (Interviewee 5 - Exmoor Case Study)

- **ENP acting as a 'one-stop shop'**

The multiple involvement in wider countryside conservation, although necessary, may be confusing for many farmers and landowners. However, Exmoor National Park is a well-recognised first point of contact for many people, often acting as a 'one-stop shop', providing essential advice and information. It is also suggested the 'one-stop shop'

approach could aid the communication and co-ordination of the various organisations, to ensure they complement, rather than duplicate, each other.

> There is an advantage being the National Park because we have a central organisation here: it is recognised by people, they will come to us for information and we're in a good position to communicate out to people, through our publications, through our staff on the ground... We are well recognised; if people have a query about almost anything they will ask us. Even if they don't like Exmoor National Park, they'll still recognise us as a point of contact. (Interviewee 1 - Exmoor Case Study)

> The other thing which we're weary of - it's a general thing that's emerging (it's not specific to Exmoor) - is sort of landowner fatigue. Confusion amongst landowners about who does what..? Whilst we understand the distinctions between all of us, it's surprising how many landowners are confused about our roles... The ENP have gone to some lengths to try and create a 'one-stop' shop approach, with the farming community, which I think works quite well. (Interviewee 3 - Exmoor Case Study)

> There are countless times when someone else has been out, and they never know who it is; it could be Somerset Wildlife Trust, English Nature, MAFF or ourselves - there's so many players involved. I do personally think it would be good if that were much simplified. (Interviewee 5 - Exmoor Case Study)

- **Negative perception of conservation organisations**

There appears to be a very strong perception that the conservation organisations are very opposed to positive management of heathland, such as burning. The conservation organisations state that they are not directly opposed to active management. They believe that the perception problem is linked with the acceptance of their conservation objective for heathland, which differs from the farming community's objective.

> I think the biggest problems we have with moorland is the perception of what we're trying to achieve, and that differs from the farmers' perception of what moorland is for, or should be for or should look like. We've probably failed, I think actually, to get the nature conservation view of moorland across to those that are actually managing moorland. There is a constant conflict - fairly friendly conflict, but a conflict of ideas as to how to manage moorland. (Interviewee 4 - Exmoor Case Study)

- **Establishment of Moorland Panel**

In an attempt to overcome this negative perception of conservation organisations a Moorland Panel has been established with significant local farmers, which meets 4-5 times a year, where they can discuss moorland and moorland management.

> Exmoor National Park set up this Moorland Panel, and I've been along to talk to them and explain why it is we manage moorland in the way we do, and that it's not difficult to manage in that way... We think everyone knows about moorland management, but it's surprising how few farmers on Exmoor actually know much about it; they've done it traditionally. (Interviewee 6 - Exmoor Case Study)

- **Lack of public acceptance of conservation solutions**

It is suggested that public acceptance of conservation solutions could be a significant barrier in the future.

> If we start stripping sensitive areas people will go absolutely bananas. I was a keen advocate of fencing a moorland site but they had an awful trouble with public meetings and consultation before they could do what they wanted... Farmers have got very little sway; they're far more concerned with public opinion... and I'm afraid whatever you do is going to need to be pretty radical. (Interviewee 8 - Exmoor Case Study)

> At the moment conservation is quite an elitist activity. I'm not sure that the majority of people are that concerned one way or the other. We do need to get more people on board and get our message across as effectively as we can. (Interviewee 5 - Exmoor Case Study)

- **Owner acceptance of conservation solutions**

It is suggested that there is a tremendous psychological barrier to overcome to ask a farmer to re-create heathland on land they have personally improved. There is also a certain degree of scepticism over whether you can actually re-create heathland on agriculturally improved land. Although, the current economic situation coupled with high incentives from the ESA scheme or any similar scheme, may create the right circumstances for this to happen.

> If the farmer you're asking to re-create an area of moorland is the one that's improved it in the first instance, you've got a tremendous psychological barrier to overcome. He's improved this land, he's done what the nation wanted in producing food and you're suddenly ask him to turn it back in to something very different... It's turning the clock back and that goes very much against the grain with some farmers. Certainly until it's been done successfully, I think they will be very sceptical about it. They simply just don't want to see their improved ground disappear: they're farmers... There is always the hope that agricultural fortunes will improve and they're going to want their best land, their improved ground, and they don't want to abandoned it to heather. (Interviewee 4 - Exmoor Case Study)

- **Fragmented woodland ownership**

The larger woodland estates have been broken up and sold off with farmland; previously the estates would have managed the woods. As a result woodlands are not integrated into the current farming system, and farmers are generally not interested or motivated by woodland management.

> On the Upland Oakwood side there are problems associated with fragmented ownership, with a lot of the woodland being owned by people who are not particularly interested or motivated by woodland management or forestry; they're linked to farms. There is this culture in Britain that woodland and farmland are very separate and were very often in separate ownership... So you haven't got this integrated system of woodland management, integrated into the farming system, as you do in France or other areas in continental Europe. (Interviewee 1 - Exmoor Case Study)

- **Exmoor Woodland Project Officer**

The creation of the post of Exmoor Woodland Project Officer is an attempt to encourage woodland owners/managers to manage their woodlands actively through the provision of advice and assistance.

> We have a project officer who is going around encouraging the owners to manage the woodlands, helping them fill out forms for WGS, looking for various ways of marketing the products. (Interviewee 1 - Exmoor Case Study)

7.4.2.6 Political

- **Adverse state of agricultural economy - neglect**

The adverse state of agricultural economy may lead to the neglect of some less productive areas, such as heathland and unimproved grassland, which are dependent on a viable mixed grazing regime.

> I think the whole of upland agriculture - well indeed the whole of agriculture - is in a muddle at the moment financially, so it could well be that actually managing these areas will be a problem. I foresee that there will be an increasing change from perhaps more people on the ground to less. Of course if you have less people on the ground, you've got less people to actually do the fairly intensive conservation management work. I think that is probably the main threat. (Interviewee 1 - Exmoor Case Study)

- **Adverse state of agricultural economy - intensification**

On the other hand, the agricultural economy may lead to the further intensification and loss of these less productive areas.

> There is also the temptation from the farming community to try and up their income by increasing stock numbers, which results in problems of overgrazing and damage to heathland. (Interviewee 1 - Exmoor Case Study)

- **Adverse state of agricultural economy - change in stocking regimes**

There is also considerable concern the agricultural economy may cause a change in the grazing regime, moving from mixed grazing to primarily sheep grazing. In the future it may become increasingly difficult to obtain the appropriate grazing necessary to support these habitats.

> I think also there is potential damage in the change in the stocking regimes, again resulting from the agricultural situation... One of the important aspects of Exmoor, as opposed to some of the other upland areas, is that you do have mixed grazing of cattle, sheep and ponies, which results in a better structure. (Interviewee 1 - Exmoor Case Study)

> A big worry at the moment is cattle, because they're worth so little, and if people start to get rid of cattle it would have a very detrimental impact upon Exmoor's ecology. (Interviewee 5 - Exmoor Case Study)

- **BSE 30-month rule**

The BSE crisis has further threatened the viable future of beef farming, with the introduction of the 30-month rule.

> BSE was threatening the cattle grazing, although now in fact the profitability of cattle is actually slightly better than sheep, currently. Depending on changes in agriculture you could get a much less varied grazing system. (Interviewee 1 - Exmoor Case Study)

- **Attachment of environmental conditions to agricultural subsidies**

The attachment of environmental conditions to agricultural subsidies has been a key factor in protecting Exmoor habitats.

> All the headage payments have environmental conditions now; they didn't use to have. Therefore, MAFF can turn round and say 'you are over-grazing, poaching or damaging this bit of moorland and if you don't stop we will remove all your subsidies'. (Interviewee 1 - Exmoor Case Study)

It is suggested that these conditions have worked particularly well on Exmoor with the ESA, as it enabled a 'carrot-and-stick' approach, and the ESA allowed farmers to change fairly painlessly, as they were then able to enter these areas of moorland into the ESA.

> It has been a major factor in achieving better management of heathland - it really has. We had a lot of problems with over-grazing and out-wintering of cattle, which caused poaching and whatever. By putting pressure on MAFF to activate the cross-compliance conditions within the subsidy schemes, we've almost removed all those problems; it's been a really key factor. (Interviewee 1 - Exmoor Case Study)

- **Conflicting policies**

There appears to be a slight conflict of polices concerning forestry and heathland conservation. On the one hand, you have a national policy to increase the area of woodland cover, so the removal of trees for heathland restoration is discouraged. On the other hand, you have a national BAP policy to re-create areas of heathland, and it is suggested that the removal of trees from former heathland sites is the most effective method.

> You've got government policy saying re-create heathland, and you've got government policy saying that Forest Enterprise must make a 3.5% profit, and we must have more woodland and not less; so you have a clash of policies. (Interviewee 1 - Exmoor Case Study)

There are national agreements to release certain areas of forestry land for heathland restoration projects, based upon a balanced judgement. However, it is believed that Exmoor is not included in these restoration areas; as a result the conservation organisations may experience significant difficulties in achieving their own BAP targets for heathland restoration, as they will have to re-plant any trees they remove.

> The Forestry Commission is involved with the national BAP for heathland and they have said that they will be taking trees off areas of heathland but their target areas are not on Exmoor. So nationally they are probably doing their thing but locally the whole idea of the BAP process in that it comes down to the local level. It's all very well for them to say that, but we need to be creating more heathland on Exmoor. (Interviewee 5 - Exmoor Case Study)

7.4.2.7 Force Field Analysis of Results

The arrows in the following table represent the significance of each opportunity and barrier, as calculated from the mean scores in Appendix 3. For clarity the thick green and red arrows represent the 'most significant' opportunities and barriers, respectively, with a mean score of 3.5 or greater, whilst the thinner green and red arrows represent the 'less significant' forces with a mean score of under 3.5.

Table 7.3 - Identification of 'opportunities' and 'barriers' affecting the conservation of Upland Heathland and Upland Oakwood on Exmoor

OPPORTUNITIES *Positive Driving Force*		**BARRIERS** *Negative Restraining Force*
	Agreement	
Partnership approach	→	
	←	Concern over ESA stocking levels
	←	Lack of consensus over heathland burning practices
	←	Lack of agreement over releasing forestry land for heathland restoration
	←	Agreement over who should run the ESA scheme
	←	Difference of opinion over need for woodland management
	←	Lack of agreement over the need for deer fencing
	Knowledge	
Aerial photographs	→	
	←	Lack of knowledge of marginal habitats
	←	Lack of specific knowledge
	←	Information not freely available
	←	Lack of monitoring
	←	Lack of information on the spread of bracken
	←	Lack of information on the encroachment of beech and rhododendron
	Technology	
Development of GIS based on aerial photographs	→	
	←	Lack of indicative planning
Exmoor Trees & Woodland Guide	→	
	←	Lack of established heathland habitat restoration techniques
	Economic	
Ownership by conservation body	→	
	←	ESA reactive rather than proactive
Application of ESA	→	
	←	ESA payment structure
ESA proactive restoration work	→	

	Difficulty entering commons into ESA
Exmoor Woodland Project Officer	
	Lack of flexibility in ESA agreements
Working Woodland Project	
	Lack of grazing specification in ESA agreements
Woodland grants	
	Grassland entered in wrong tier of ESA
New Native Woodlands in National Parks	
	Moving stock from ESA to surrounding land
	Lack of labour to control burning
	Lack of woodland markets
	High cost of deer fencing
Social	
Advisor field visits	
	Negative perception of conservation organisations
ENP acting as 'one-stop shop'	
	Lack of public acceptance of conservation solutions
Establishment of Moorland Panel	
	Owner acceptance of conservation solutions
Exmoor Woodland Project Officer	
	Fragmented woodland ownership
Political	
Attachment of environmental conditions to agricultural subsidies	
	Adverse state of agricultural economy - neglect
	Adverse state of agricultural economy - intensification
	Adverse state of agricultural economy - change in stocking regime
	BSE 30-month rule
	Conflicting policies

CHAPTER 8 BLACKMORE VALE CASE STUDY

8.0 CASE STUDY DESCRIPTION

The Blackmore Vale Study Area is located within the Wessex Vales Natural Area, which comprises the undulating ground lying between the chalk escarpment of Dorset and Wiltshire to the east, the Somerset Hills to the west and the Oxford Clay Vale to the north (Figure 8.1).

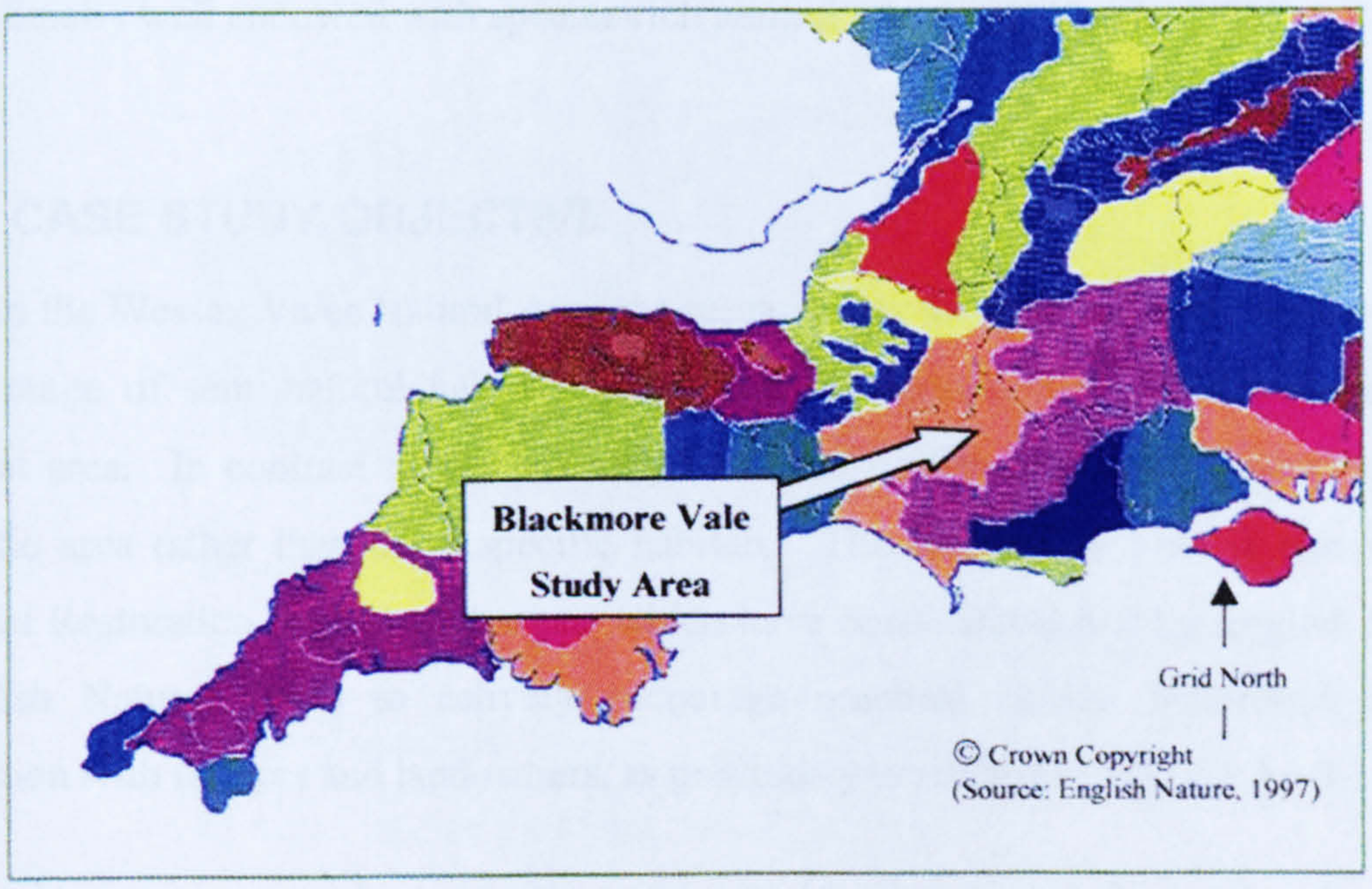


Figure 8.1 - Location of the Blackmore Vale Study Area in South west England

The landscape of the Natural Area is characterised by pastures and meadows enclosed by a network of tall thick hedges with numerous small copses and ancient woods. Sinuous woods follow deeply incised stream valleys that feed into rivers which drain into both the north and south coasts (Heath, 1998). The underlying settlement pattern is highly dispersed with stone hamlets and the occasional isolated houses and farmhouses existing side-by-side with nucleated settlements, an indication of significant change through time (English Nature, 1998).

8.0.1 Land Use

The economy is based on agriculture and tourism and there is a significant link between the high-quality of the environment and tourism both on the coast and inland. There is some light industry on the coast and around the Yeovil area (Heath, 1998).

8.0.2 Habitats

The Wessex Vales contain a variety of important habitats, which have often developed around an intricate network of rivers and stream valleys, such as unimproved grasslands and broad-leaved woodland. The Natural Area contains a high proportion of the region's unimproved grassland. Nationally there has been a loss of around 95% of the unimproved pastures and compared to the rest of the country the Wessex Vales appear superficially well endowed with species-rich neutral grassland (Heath, 1998).

8.1 CASE STUDY OBJECTIVE

Within the Wessex Vales Natural Area the research has focussed upon the conservation of a range of semi-natural habitats within the Blackmore Vale Habitat Restoration Project area. In contrast to the previous two case studies this study focuses upon a specific area rather than upon specific habitats. The Blackmore Vale is one of four Habitat Restoration Project trial areas, which have been established by English Nature (English Nature, 1996) to actively encourage practical habitat restoration in co-operation with farmers and landowners, as previously described in Section 3.4.2.3.

> The aim is to investigate ways of increasing the variety and abundance (the biodiversity) of our wildlife, focussing on reversing habitat fragmentation, by using existing Environmental Land Management Schemes (ELMS) such as Countryside Stewardship. (Eppey *et al.*, 1998, p.4)

Each of the four trial areas has been chosen to represent a particular type of agricultural landscape typical of lowland England. The Blackmore Vale represents a typical "English lowland pastoral system, composed of small, grassy fields, defined by a dense network of hedgerows, streams and small roads with colourful, flowery verges" (Eppey *et al.*, 1998, p.9).

It was suggested (Kirby, 1998, pers. comm.) that the inclusion of one of the English Nature Habitat Restoration Project areas in this research may lead to benefits for both studies. Indeed, the staff involved in the project empathised with the research subject and were keen to assist. Similarly, the interview transcripts from this case study were requested and used by English Nature to assist with the production of the final Habitat Restoration Project report (Thomas, 2000).

8.1.1 Landscape Alteration Level

Superficially, the landscape does not appear to have changed radically in the last fifty years, however, the extent and quality of semi-natural habitats has decreased considerably largely owing to agricultural intensification and conifer planting (Eppey, 1998). The extent of existing habitat cover in the Blackmore Vale is detailed in Figure 8.2.

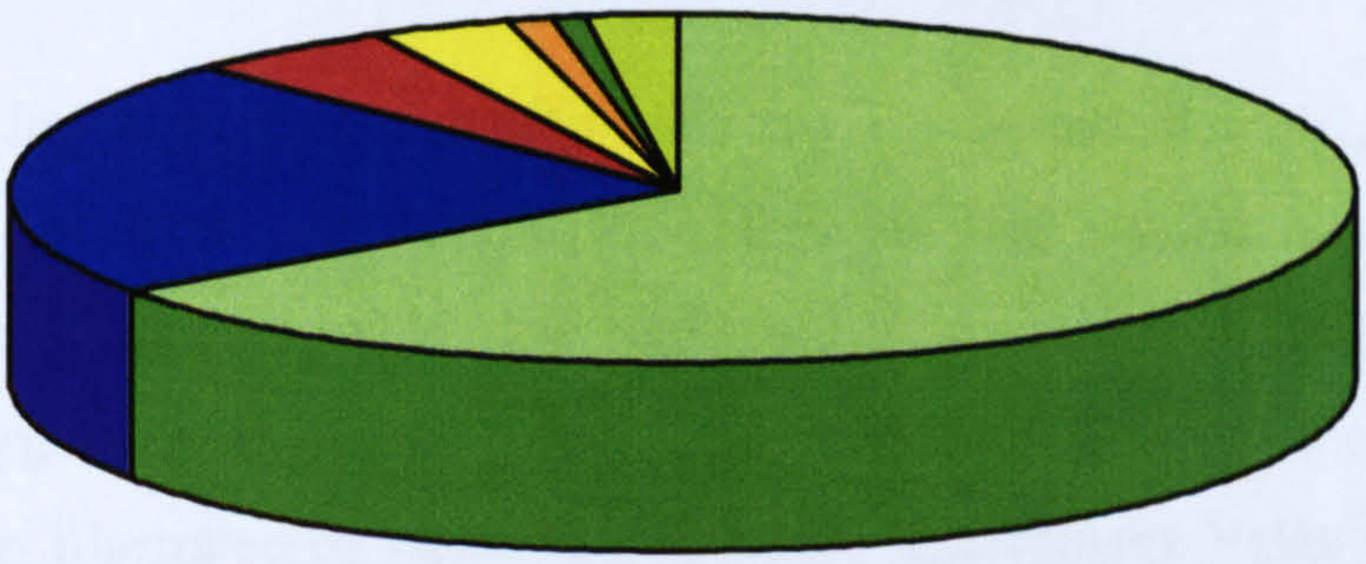


Figure 8.2 - Percentage of habitat cover within the Blackmore Vale Habitat Restoration Project area

Source: Data from (Eppey *et al.*, 1998).

In particular there has been a 60% loss of Dorset's neutral grassland, which is described as "Dorset's most threatened habitat" (Eppey *et al.*, 1998, p.17), between1982 and 1988 (Jefferson, 1996). The south west region contains a high proportion of this habitat, possibly approaching 50% of the total UK resource (Cordrey, 1997). The Blackmore Vale also contains the densest and largest recorded population of the marsh fritillary butterfly in the UK, which is declining at a rate of 10% per decade, with the south west holding nearly 50% of the UK population (Cordrey, 1997; Eppey *et al.*, 1998). The marsh fritillary butterfly naturally exists in metapopulations, which are heavily dependent on a network of nearby habitat patches to ensure their long-term survival. Cordrey (1997, p.182) states that "it is, therefore, vital to maintain large areas of land

with networks of colonies and potentially suitable (but sometimes unoccupied) habitat between".

The two Sites of Special Scientific Interest (SSSI) within the Blackmore Vale further confirm the importance of conserving these semi-improved habitats and species, containing both species-rich grassland and major populations of the marsh fritillary butterfly. In order to protect this internationally scarce butterfly, the two sites have been proposed as a Special Area for Conservation (SAC) under the EU Habitats Directive (Eppey *et al.*, 1998).

Although there has been a considerable decrease in the extent and quality of semi-natural habitats within the Blackmore Vale, there is still a good mosaic of wildlife habitats throughout the area, which are connected by a system of streams, hedgerows and roadside verges (Eppey *et al.*, 1998). The connection between these semi-natural habitats is further illustrated by Heath (1998, p.15): "the Wessex Vales contains a well-developed network of hedgerows... that form important links between fragmented semi-natural habitats". From this description, it is fair to assume that the Blackmore Vale represents a variegated/fragmented landscape on the landscape alteration continuum, with a moderate degree of habitat destruction and a moderate to high level of habitat modification, as illustrated in Figure 8.3.

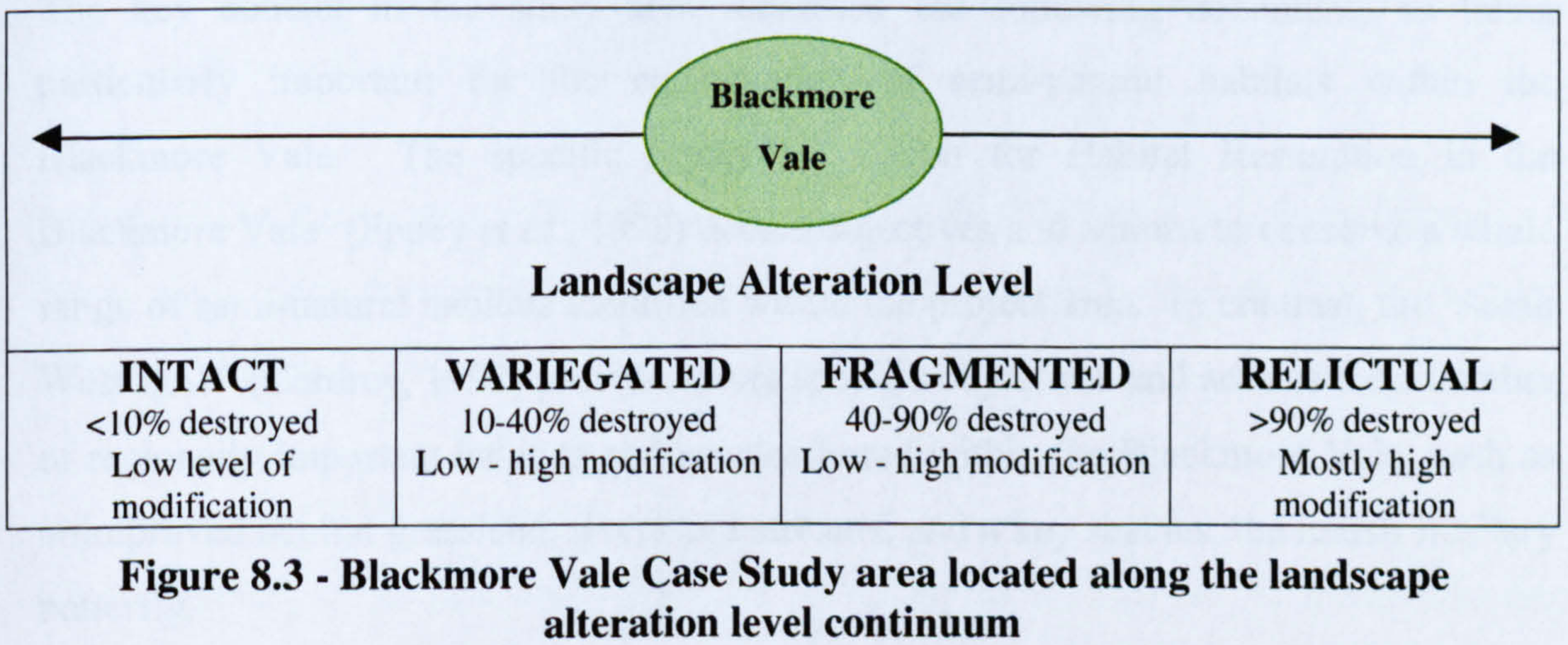


Figure 8.3 - Blackmore Vale Case Study area located along the landscape alteration level continuum

Source: Based on (McIntyre and Hobbs, 1998).

8.1.2 Wider Countryside Objectives

The specific wider countryside objectives for a variegated/fragmented habitat, such as the semi-natural habitats within the Blackmore Vale, are concerned with the maintenance of the existing habitat matrix and patches; the improvement of habitat fragments, connecting and buffering areas; along with the reconstruction of connecting and buffering areas, according to Table 5.2. The definition of these specific wider countryside objectives provided the necessary focus for the subsequent content analysis.

8.2 SUITABILITY OF CASE STUDY AREA

The Blackmore Vale Case Study satisfies the selection criteria, as described in Section 5.1.2, in a number of ways: the lowland pastoral farming represents a 'typical' agricultural system; the landscape alteration level represents a degree of 'typicality' between the 'extremes' of the previous two case studies; whereas the focus upon the Blackmore Vale Habitat Restoration Project area provides an 'extremely' positive element of good practice.

8.3 CONTENT ANALYSIS OF BIODIVERSITY PLANS

8.3.1 Key Biodiversity Plans

The key contact in the study area identified the following documents as being particularly important for the conservation of semi-natural habitats within the Blackmore Vale. The specific report 'A Vision for Habitat Restoration in the Blackmore Vale' (Eppey *et al.*, 1998) details objectives and actions to conserve a whole range of semi-natural habitats identified within the project area. In contrast, the 'South West BAP' (Cordrey, 1997) provides more specific objectives and actions for a number of regionally important habitats and species found within the Blackmore Vale, such as unimproved neutral grassland, rivers and streams; and a key species, the marsh fritillary butterfly.

In addition, a number of other documents also make reference to the conservation of these habitats, often supporting these key biodiversity plans. For instance, the Dorset Stour Local Environment Agency Plan (Environment Agency, 1998a) outlines the need to support, and contribute to, the Blackmore Vale Habitat Restoration Project. The

Wessex Vales Natural Area Profile (Heath, 1998) describes the need to ensure local co-ordination between their objective, to enhance biodiversity in the Wessex Vales, with current and future biodiversity plans and projects.

- **A Vision for Habitat Restoration in the Blackmore Vale**

The 'Vision for Habitat Restoration in the Blackmore Vale' report (Eppey *et al.*, 1998) provides a summary of existing habitats within the area and describes the factors affecting their conservation. The report then suggests a plan for habitat restoration, based around a 'vision' map of existing habitats and suggestions of areas where habitat restoration will have the greatest impact.

The vision for future habitat restoration aims, in discussion with the farming community, to create a diverse arrangement of rich wildlife habitats by:

- Protecting and maintaining existing habitats
- Restoring existing unmanaged habitats
- Improving under-managed habitats
- Buffering and extending existing habitats
- Creating linkages between remnant habitats
- Creating new habitats
- Encouraging management of farmland by less intensive methods

(Eppey *et al.*, 1998, p.19)

It then details the necessary objectives and targets for each habitat to achieve the project aims, along with the necessary mechanism and incentives to secure their successful implementation.

- **Action for Biodiversity in the South - West**

This regional action plan was produced to assist in the process of translating the national targets of the UK BAP (UK Government, 1994a) into action at the local level. The South West BAP (Cordrey, 1997) identifies the most important habitats and species within the south west of England, and sets them within a national context, and provides guidance to help ensure a link between local effort and the UK plan.

> The South West Biodiversity Partnership offers these plans in the hope that they will enable local action. In turn this will secure the future for the region's rich biodiversity and ensure that the region plays its full part in implementation of the UK Biodiversity Action Plan. (Cordrey, 1997, p.ii)

8.3.2 Identification of Relevant Objectives

The key biodiversity plans were examined to assess whether their objectives for the conservation of semi-natural habitats within the Blackmore Vale were consistent with the wider countryside objectives for the study area (8.1.2), namely maintenance of the existing habitat matrix and patches; improvement of habitat fragments, connecting and buffering areas; and reconstruction of connecting and buffering areas. The results, presented in Table 8.1, clearly confirm that the plan objectives for a small selection of semi-natural habitats are consistent with wider countryside principles.

Table 8.1 - Key biodiversity plan objectives related to the landscape ecological objectives for Blackmore Vale

Landscape Ecological Objectives	*Key Biodiversity Plan Objectives*	
	A Vision for Habitat Restoration in the Blackmore Vale	**South - West Biodiversity Action Plan**
Maintenance of habitat matrix and patches	***Broad-leaved Woodland***	
	1. Restore and enhance the wildlife value of existing woodland	Not in plan
	Neutral Grassland	
	1. Protect and maintain existing areas of neutral grassland	1. Protect the existing neutral grassland resource
Improvement of habitat fragments, connecting and buffering areas	***Broad-leaved Woodland***	
	1. Restore and enhance the wildlife value of existing woodland	Not in plan
	Neutral Grassland	
	2. Restore and extend existing areas of neutral grassland	2. Secure all existing sites greater than 0.5 hectares in sustainable management regimes
Reconstruction of connecting and buffering areas	***Broad-leaved Woodland***	
	2. Extend and/or link existing woodland habitat	Not in plan
	Neutral Grassland	
	2. Restore and extend existing areas of neutral grassland	3. Restore and expand the quantity and quality of the neutral grassland resource by linking and buffering existing sites
	3 Re-create neutral grassland to extend existing sites and/or link separate sites	

8.3.3 Definition of Initial Opportunities and Barriers

After the biodiversity plan objectives were confirmed as being consistent with the case study objective, the associated implementation actions were categorised, as opportunities or barriers, under the categories of agreement, knowledge, technology, economic, social and political. This identification of the *initial* opportunities and

barriers to the implementation of the biodiversity plans, provided by the content analysis, allowed the construction of a force field analysis framework (Table 8.2). This framework clearly presented the opportunities and barriers, and acted as an effective basis for the further exploration of these through a series of interviews with key actors.

Table 8.2 - Initial 'opportunities' and 'barriers' identified by content analysis of Blackmore Vale biodiversity documents

OPPORTUNITIES *Positive Driving Force*		**BARRIERS** *Negative Restraining Force*
	Agreement	
Partnership approach	→	
	←	Poor communication/co-ordination
	Knowledge	
	←	Lack of knowledge of habitats/species
	←	Lack of monitoring
	←	Lack of habitat management knowledge
	Technology	
Indicative planning pilot project	→	
	←	Absence of indicative planning
	←	Lack of established habitat restoration techniques
	Economic	
Application of Countryside Stewardship/woodland grants	→	
	←	Insufficient flexibility/targeting of Countryside Stewardship
	←	Need for higher incentives
	Social	
Advisor field visits	→	
	←	Limited awareness of site owners
Information material	→	
	←	Limited public awareness
	←	Mistrust/suspicion of conservation organisations
	Political	
	←	BSE crisis

Once again the analysis demonstrated the importance of the South West BAP (Cordrey, 1997), as it identified the necessary implementation actions to achieve conservation objectives for specific habitats and species within the Blackmore Vale. However, the Vision for Habitat Restoration Report (Eppey *et al.*, 1998) also contained a section on implementation actions, which gave an indication of a range of opportunities and barriers.

8.4 INTERVIEWS WITH KEY ACTORS

Eight interviews were conducted with individuals identified as being actively involved with the conservation of semi-natural habitats within the Blackmore Vale Case Study area. No particular problems concerning access or co-operation were experienced: on the contrary, the majority of key actors sympathised with the research subject and were keen to assist. The interviewees represented the following organisations:

- Dorset Wildlife Trust (2)
- Farming and Rural Conservation Agency (1)
- English Nature (2)
- Environment Agency (1)
- Farming and Wildlife Advisory Group (1)
- National Farmers Union (1)

8.4.1 Coding and Categorising of Interviews

The coding and categorising process produced 62 separate categories, either opportunities or barriers, under the six distinct headings of: Agreement; Knowledge; Technology; Economic; Social and Political. This process produced coding categories and a NUD.IST coding tree similar to the Culm Case Study, as outlined in Appendix 1.

The results of this coding and categorising process allowed the construction of a case study report, briefly describing each of the actual opportunities and barriers identified from the interview transcripts. It also allowed the construction of a revised force field analysis framework, listing the actual opportunities and barriers affecting the implementation of biodiversity plans for the conservation of semi-natural habitats within the Blackmore Vale area.

8.4.2 Interview Results

These case study reports and revised force field analysis were then returned to each of the interviewees, to review the results and to score the significance of each opportunity and barrier. 75% of the original interviewees reviewed the case study reports and completed the scoring process. The results from the Blackmore Vale Case Study interviews are presented in the form of a final force field analysis at the end of this chapter (Table 8.3), and each opportunity and barrier is described in the following sections, with a summary of the scoring process in Appendix 4.

8.4.2.1 Agreement

- **Partnership approach**

The partnership approach is widely considered as one of the most significant opportunities for conservation in Dorset, as it allows the various partners to bring in their different skills and experience and work towards common objectives.

> There are lots and lots of projects, initiatives and organisations going ahead with different conservation projects, but we all want the same thing. So a big opportunity, which I think we need to take into account, is that we need to work together; we need to be aware of different projects... If another project is developing and it could be linked into my local BAP, I would try to make sure that we could work together. (Interviewee 2 - Blackmore Vale Case Study)

> We need to bring people together, make sure that they work together, and make sure that we identify targets together, so there is commitment within the partnership. My role basically is to make sure that the projects go ahead and the targets are achieved, to stimulate the partners and fill in the gaps of what is needed - for example, fund raising, raising awareness and co-ordination. (Interviewee 2 - Blackmore Vale Case Study)

- **Poor communication between partners**

Communication does not appear to be a significant issue between the partners, with a good system of meetings and working groups. However, there was concern that there has been an increase in the number of meeting as a result of the BAP process.

> I think we've already got quite a good network of meetings where necessary; I'm reluctant to encourage more meetings because it's not always necessary. I think the number of meetings they've had in the Blackmore Vale, although I haven't been personally involved, have been sufficient to keep it going.

> We have quite a lot of contacts with all the organisations, like DWT, EN, and I think we maintain those contacts reasonably well without formal meetings. (Interviewee 6 - Blackmore Vale Case Study)

> We do have partner liaison meetings, and I work very closely with a number of organisations in Dorset, particularly FWAG, DWT and EN... The biodiversity side of things seems to have generated an awful lot of meetings... and sometimes just going to meetings isn't always necessary. It depends what you're discussing... you need to balance your time, because I think it's always time well spent... It's sometimes difficult with all the other work you have going on; you could have millions of meetings, all you need is a mechanism feeding back what happens in all the other meetings that you can't attend. (Interviewee 3 - Blackmore Case Study)

- **Communication benefits from field meetings**

It has been suggested there may be considerable communication benefits from the establishment of more informal, field-based meetings, which may help to develop these important informal relationships.

> I think it's useful to have more practical meetings as well, rather than discussions around the table; to actually go out and have a look at sites and try and share experiences and information. We've already had a seminar with English Nature and various other organisations on arable reversion, that will be feeding back into research...I think that's useful because then you can hopefully agree some sort of consistency. (Interviewee 3 - Blackmore Vale Case Study)

- **Need for co-ordination of partners/projects**

As suggested earlier, a major opportunity comes from pulling together existing biodiversity projects, although the co-ordination of the multiple organisations involved is critical, to ensure that they are all pulling in the same direction with common objectives.

> Co-ordination is an opportunity, but it could also be a barrier. Money is limited, and there are a lot of organisations out there who want the same thing. There is fund raising going on, so if you don't co-ordinate efforts that could be a barrier - the fact that there is competition for these limited funds. (Interviewee 2 - Blackmore Vale Case Study)

> It's not essentially a barrier but it's something that needs to be developed more, is when you're trying to set up schemes and agreements is getting all the right information at the time when you need it, and getting everybody pulling together in the same direction. Particularly with complicated issues like water level management, you've got lots of different organisations involved or need a lot of expertise in trying to decide what's the best way to proceed. (Interviewee 3 - Blackmore Vale Case Study)

It was also considered particularly important to co-ordinate the efforts of the field officers, with their limited time and resources.

> Quite often I go out and talk to people, and I find out that they had FWAG there last month, and they've got ADAS coming next week. There are people out there who like to get as many people in as possible to pick everybody's brains. I just hope we're all giving the same advice. (Interviewee 1 - Blackmore Vale Case Study)

> One of the serious drawbacks of environmental conservation... is that there are lots of disparate 'blinkered vision' groups all charging off in different directions, all aiming to achieve their own individual goals. (Interviewee 8 - Blackmore Vale Case Study)

> It's got to a point where there are too many people trying to give advice, particularly the NGOs. (Interviewee 4 - Blackmore Vale Case Study)

- **Co-ordination/communication benefits provided by the Blackmore Vale Habitat Restoration Project**

It is suggested that the indicative plan, or 'vision map', provided by the Blackmore Vale Habitat Restoration Project is a very useful tool for co-ordinating conservation efforts and providing an opportunity to gain agreement over common objectives and to identify areas of potential conflict and disagreement.

> All the partner organisations have commented that they found it a very common approach, because we've all got common goals of what we're trying to achieve and deliver. With the 'vision map' we're all working towards the same goals, and working in partnership with the other organisations... It's a very close working environment where you know what other organisations are doing and the map really brings it together very well. (Interviewee 7 - Blackmore Vale Case Study)

> It helps us know what the left hand and right hand is doing. It's been a great discipline working things out in the Blackmore Vale and actually finding out who's advising who and what's happening, and having to try and co-ordinate and go for the same objectives altogether. (Interviewee 5 - Blackmore Vale Case Study)

> You really need to bang heads together a bit to get an agreed map and it's a very useful tool for getting groups to agree or find out where there is disagreement. The RSPB resented us really going so much for increasing woodlands, but we knew that this is something that tends to be popular with farmers, and it is one of the few Natural Areas where we want more trees. We felt the need to connect, expand, link and buffer the existing woodlands, whereas the RSPB wanted much more concentration on grasslands, and it's only with the map that you tease out those differences. (Interviewee 5 - Blackmore Vale Case Study)

- **Lack of co-ordination of Biodiversity Action Plans**

The rapid development of BAPs (BAP) at the local level, and the lack of a common methodology, has caused concern that they may become separated from each other and the National BAP, making it difficult to report back to the national level.

> As local BAPs are cropping up and developing in different ways, we need to be very careful to make sure we talk to each other and that we're co-ordinated, otherwise it could be a waste of resources. I could see a barrier that local BAPs could not be co-ordinated with the national process, which would be a shame because the constraints and the issues are at a local level... We decided we wanted a regular meeting to report what we're doing and to see if we've got common issues... If we can work together then we can all have one voice to go to the national level; we want to have a regional voice that could be heard. For example, if I have a problem issue concerned with the lack of arable incentives, and the same issue crops up in Gloucestershire and Devon we can all go together to MAFF and say that the south west needs this; it is a much stronger case. (Interviewee 2 - Blackmore Vale Case Study)

- **Lack of consensus on woodland restoration techniques**

It is suggested that a lot of woodlands in Dorset will have to go through a restoration phase in order to improve the conditions for producing timber in the future, as many of them have been neglected, unmanaged and re-planted. However, there appears to be a lack of consensus on woodland restoration techniques.

> There's no clear consensus on restoration. I think intuitively we know the best ways, but because it's not been done before or demonstrated very much, moving conifers off an ancient site is only just starting to be done and we've got quite a lot to learn about that. We cannot afford to wait to know how to do it, before we start doing it. That's the other thing, because a lot of these woods have been modified since WW2 and time's ticking away for the seed bank. (Interviewee 4 - Blackmore Vale Case Study)

8.4.2.2 Knowledge

- **Lack of specific habitat/species knowledge**

A lack of specific knowledge of species and habitats is widely regarded as a significant barrier, as it is necessary for the successful targeting of conservation efforts. There is particular concern about specific knowledge gaps associated with BAP targets. It is also suggested that it is often difficult to fund important survey work, as this must compete with the need to produce conservation benefits on the ground.

> The lack of specific knowledge is especially important where we have biodiversity targets for things and we don't even know where they are. The great crested newt: an internationally important species, a BAP key species, and we didn't know where it was. There we are doing this biodiversity project in the Blackmore Vale; we weren't meant to be surveying species we're just meant to be surveying habitats... but the survey turned up very good results in an awful lot of ponds. Bat distribution we don't really know in the area. (Interviewee 5 - Blackmore Vale Case Study)

> A lack of specific knowledge is definitely a major problem, not for everything, but for a lot of things - particularly our BAP stuff that we weren't necessarily aware of five years ago, and so the historic work isn't there. So that is a problem. The problem that we then have is for us to get funding for surveys is quite difficult, because they want it to be targeted to on the ground enhancements. You can say till you're blue in the face that you need the survey work to target the enhancements, but you have to tie it in quite carefully to get that funding. Collaborative projects are often a way to do that. (Interviewee 6 - Blackmore Vale Case Study)

However, it was also pointed out that a lack of specific knowledge should not prevent conservation action from taking place, emphasising the need to act on the best knowledge we currently have, whilst being prepared to update conservation actions as new research becomes available.

> I think we have quite a lot of information already, but it's an ongoing process... Research is ongoing for everything, but we can't know everything. We operate on the ground on the basis of the knowledge we have at the moment, and then obviously we keep updated of what's cropping up. For example, the pearl-bordered fritillary: they've just discovered through a recent study that the leaf litter is crucial. Before we thought the violet density was crucial, but now this new evidence suggests that leaf litter is as important as the violets. These are factors that we need to consider when we select sites; we need to make sure there are enough broadleaves, so there is enough leaf litter. It's very important to make sure the process is dynamic, so as opportunities or research arise, they can be incorporated. Your projects might change depending on new findings. (Interviewee 2 - Blackmore Vale Case Study)

- **Lack of knowledge of marginal sites**

There is an increasing interest in the restoration potential of marginal wildlife sites in the wider countryside, as many of the larger, high-quality wildlife sites are in conservation agreements. However, there is currently a lack of knowledge of these marginal sites that have the potential to extend, link and buffer the existing wildlife sites. The need to conduct a full phase-one survey of the Blackmore Vale Habitat Restoration Project area demonstrated the existing lack of knowledge and the importance of obtaining information of the marginal habitats in the wider countryside, to target future conservation/restoration efforts.

I would say that there probably is a lack of knowledge on the whole, in as much as we wouldn't have any data on those types of sites... I think there is certainly a lack of knowledge in the wider county. (Interviewee 1 - Blackmore Vale Case Study)

I wouldn't say there's a poor knowledge base, but certainly when you're concentrating on an area like the Blackmore Vale, to have a phase-one and a map of the area really does make the difference, especially for fragmentation and when you're trying to link habitats. FWAG always come from the viewpoint of working on a whole-farm situation... but this has actually taken it a few steps further... You can actually build an overall picture to really get the links. Sometimes it may not be a continuous link in so far as a wildlife corridor, but you can certainly look to stepping-stones for instance. (Interviewee 7 - Blackmore Vale Case Study)

- **Poor co-ordination of knowledge**

It has been suggested that rather than a lack of knowledge, the problem is associated with the co-ordination of the existing information.

More than the lack of knowledge, I think the problem is the co-ordination of this knowledge into a communal source of information, which is the records centre. I think this is happening now, and I think the local BAP is very important to address these issues, and that's something that we're doing in Dorset. (Interviewee 2 - Blackmore Vale Case Study)

- **Lack of monitoring**

There is concern about the lack of monitoring of habitat management, as adequate monitoring will provide mileposts to check how things are going and guide subsequent management actions. It is considered especially important to monitor the effects of Countryside Stewardship.

I think all these things are very important, especially monitoring the effects of Countryside Stewardship agreements, because once you put lots of money in it would be nice to find out if it works. (Interviewee 2 - Blackmore Vale Case Study)

Within Countryside Stewardship they are now doing what the FRCA call 'care and maintenance visits', and this is a good thing. Basically I think they try and visit all agreement holders in their second year, basically to see that they are carrying out what they said they would carry out, and any confusion can be sorted out. Sometimes with the best will in the world, people don't actually quite understand what it is they're supposed to be doing. (Interviewee 1 - Blackmore Vale Case Study)

Further, it has been suggested that the amount of monitoring of Countryside Stewardship sites should be increased.

> I think one would probably like to see FRCA resourced to do even more. I personally think they ought to be resourced to go and look at agreements in year 2 and year 6, because in year 6 if you have a slippage you've still got 4 years to correct it. (Interviewee 1 - Blackmore Vale Case Study)

> Another problem with Countryside Stewardship is really the lack of monitoring and follow-up on the sites. Things could be going very wrong out there, especially if we are to increase CS funding. It's a very powerful tool and it's very standardised and it's difficult to get the individual tailoring to sites without that follow-up or at least a large input from other people like FWAG or the Wildlife Trust, not only just in drawing up the individual schemes. Our experience of management of SSSIs is that you very much need to stay with the farmer and be there as an advisor to help them organise the works... and come out and check how it's going and discuss problems and things. You can't do land management advice as a one-off job and that's what CS does basically. (Interviewee 5 - Blackmore Vale Case Study)

However, it was correctly pointed out that monitoring is a matter of balance.

> Monitoring is very important, but I think we need to be aware of not wasting too much time and energy on monitoring and assessing; otherwise we won't do anything on the ground. So I think it's a matter of balance. I've seen so many times, getting lost in studies and then the species might be extinct if you don't take action. (Interviewee 2 - Blackmore Vale Case Study)

- **Lack of habitat management knowledge**

There is apparently adequate management knowledge for most semi-natural habitats in Dorset.

> We know which kind of management techniques to use for most of the time... We have lots of expertise in Dorset; English Nature are especially knowledgeable on management techniques... Sometimes we don't and we need to investigate. (Interviewee 2 - Blackmore Vale Case Study)

> I think there is accepted fundamental ways of managing grasslands and woodlands. It's not what's out there, it's how do we manage it and ensure that management is sustainable - that's the crux of it really. (Interviewee 4 - Blackmore Vale Case Study)

It was also stressed that the lack of specific knowledge should not prevent management from taking place.

> We operate on the ground on the basis of the knowledge we have at the moment, and then obviously we keep updated of what's cropping up... I think managing habitats is all about experimenting, because habitat management is different at the local level... It's important to make sure that the process is dynamic, so new opportunities or research can be incorporated. (Interviewee 2 - Blackmore Vale Case Study)

- **Lack of knowledge about changes in farm ownership**

The current agricultural economy has led to rapid changes in farm ownership, with farms being sold to adjacent farms and 'incomers' from the south east, who are buying farms as country/second homes. Conservation organisations are very keen to approach these 'incomers' with conservation advice, although they are finding it difficult to identify changes in farm ownership.

> An obstacle is actually reaching these people, because how do we know when a site changes hands, we have serious problems on that issue. We need to identify these people and we need to get in there with our advice, early, before they go and trash it through ignorance. As luck would have it, there are some people who proactively approach us, and that is good. (Interviewee 1 - Blackmore Vale Case Study)

8.4.2.3 Technology

- **Absence of indicative planning**

There is a possible need to have an indicative plan to indicate areas for future habitat restoration, to extend, link and buffer existing areas. This useful strategic framework will allow the better targeting of time and resources to make a significant impact. An indicative plan would also ensure the various organisations are working towards the same objectives and making the best use of the available resources. Yet, the success of an indicative plan is dependent on adequate knowledge of the wider countryside, which is currently lacking, and the appropriate funding mechanisms, such as the over-stretched Countryside Stewardship scheme.

> What we need to know, the experts need to know, is what we want and where; where the optimal habitat positions are. (Interviewee 5 - Blackmore Vale Case Study)

> I think you have to have some clear targets, otherwise you could waste a lot of time and money putting effort into sites here and there. It would certainly be a good starting point. (Interviewee 4 - Blackmore Vale Case Study)

> This could be very good for some species, for example, for pearl-bordered fritillary we have just one site where there are a few colonies and that's it.

> So we really need to make sure that we've got a plan for it, because we can't really afford to just try. For the pearl-bordered fritillary we build up a map with the existing colonies in Dorset, and Wiltshire, and then we're setting up a plan to make sure that these colonies could eventually link. To do that we highlight all the woodlands between the Dorset and Wiltshire colonies, all the south-facing slopes, all the derelict coppice woodland that needs to be managed; then we're going to contact landowners and hopefully we're going to be backed up by incentive schemes. (Interviewee 2 - Blackmore Vale Case Study)

It was also suggested that farmers would be quite interested to see the wider objectives and how their land fits into the bigger picture.

> I think it would actually be quite helpful in showing people why you want to do things - if you can demonstrate that these links would be necessary for whatever reasons. They can then see other links throughout the area and what they're contributing to. (Interviewee 4 - Blackmore Vale Case Study)

> In my experience, most of them would be quite interested... They want to have a view of the end product, what the objective is and what they're actually going to hopefully achieve at the end of the agreement. It does help to be able to give them some idea of putting their little block of land in the wider context. (Interviewee 3 - Blackmore Vale Case Study)

Others believe a lot can be achieved in the short term without a strategy, as opportunities arise. In a farmed landscape, there is no public control over land use, so that reliance must be placed in individuals and voluntary agreements, and the best-laid plans can and will go awry.

> For some of them there will be a fear associated with seeing their land identified on a plan. We've had this in other areas; there's a classic case that happened in west Dorset in the early 90s, when SNCIs became the buzz designation of the time and these were allegedly non-statutory... Until the farmer found that when he went to the district council to look at the local plan and found SNCI were marked on the local plan and he flipped! Because on the basis of it appearing on the local plan, his plans to diversify, or whatever, were potentially thwarted. So all of a sudden it had a significance, which he was promised that it wouldn't have. (Interviewee 8 - Blackmore Vale Case Study)

> Obviously you have to be careful that it's not seen that you're telling them what to do... People tend to think that anything on the map, they want to do that there and that there, which isn't what we're trying to do at all... You have to stress it's just possible opportunities... It's really just a tool to help you give conservation advice...and to focus on the precise management that you might do if certain species are there, or there's potential to extend the habitats for certain species. (Interviewee 3 - Blackmore Vale Case Study)

- **Indicative planning pilot project - Blackmore Vale Habitat Restoration Project**

The Blackmore Vale Habitat Restoration Project is based upon an indicative 'vision' map, with an aim of targeting conservation efforts to extend, link and buffer existing habitat areas, to reverse the continued degradation and fragmentation of the wider countryside. The indicative planning approach adopted within the Blackmore Vale is widely regarded as a major conservation opportunity.

> A 'vision map' is useful because it highlights where the existing habitats are, where the soil, etc. is suitable for restoring other habitats, and linking those habitats up. I think this information is vital. (Interviewee 3 - Blackmore Vale Case Study)

> Certainly, as far as my work is concerned, it's been a major tool that I've used, from knowing what's on your doorstep and in your neighbouring areas. You wouldn't have such a detailed knowledge, normally speaking; you would know roughly but you wouldn't know particular species or the detail of those habitats...To have a picture in front of you that you can join up has certainly been the main thing that I've worked from. (Interviewee 7 - Blackmore Vale Case Study)

> I'm very supportive of the Blackmore Vale Habitat Restoration Project, because that looks at 100 square kilometres. It has given them the opportunity to focus their minds, and indeed our minds, and lots of other minds, on what we want to achieve and why. (Interviewee 1 - Blackmore Vale Case Study)

A particular strength of the Blackmore Vale 'vision' map is the way it was implemented, with farmers being approached in a very gentle, unofficial manner.

> In the early days of the HRP we were very, very vocal in saying 'that whatever goes on here it mustn't appear on any official document, to the extent that the farmer will feel oppressed by it'. (Interviewee 8 - Blackmore Vale Case Study)

> I thought long and hard about how to actually approach the farmers... We didn't want to just broadcast and send it out everywhere, because naturally they could be horrified by seeing all the shaded areas where we'd like to plant woodland, etc. That could really build a brick wall that you couldn't get past, so there was a lot of time and thought about the best way to actually get it across. I actually chose to do it on a very personal level...With the farmers I actually gave it to them on face to face contact, so I tied in with a farm visit, and because I was there to explain it at the time, then it was fine. (Interviewee 7 - Blackmore Vale Case Study)

However, there are concerns that the production of an indicative plan may have been an excessively costly process, which may have directed limited funds away from actual conservation improvements on the ground.

> Obviously the cost of producing that 'vision' map was quite high, I don't know exactly how much, but it's certainly was very costly... You can always have the argument of how much money do you put into surveying, and when do you draw the line and actually put money into practically helping people to actually change things on the ground. That's your ultimate goal... I would have liked to have done it cheaper, to then have more time and money available to achieve something on the ground. (Interviewee 7 - Blackmore Vale Case Study)

- **Indicative planning pilot project - 'Unconscious project' by DWT**

The Dorset Wildlife Trust has also undertaken a targeted approach to conservation in the west of the county, although it was pointed out that the project happened by default in a way, rather than by a conscious approach.

> What we've achieved so far, unconsciously, in the Devon Wildlife Trust is that we've almost done a habitat restoration scheme in the west of the county. We've used the old meadows and pastures option of CS to create a pretty big band of unimproved grassland, which is almost, but not quite continuous. There's a great band of land that's gone into CS... it's quite impressive. Although, we didn't actually set out to achieve what we've achieved... it happened by default in a way, rather than by a conscious approach. The conscious approach was that we said we wanted to get involved in CS, we wanted to promote the old meadows and pastures option, and because of that this happened. (Interviewee 1 - Blackmore Vale Case Study)

- **Lack of established habitat restoration techniques**

The techniques for restoring semi-natural habitats appear to be quite well established.

> It depends what level of restoration you're talking about... I think for the sort of level we're talking about in the Blackmore Vale the restoration and management techniques are well established. (Interviewee 6 - Blackmore Vale Case Study)
>
> We basically know how to go about this, although it's not necessarily easy, because those improved sites may very well have a pretty high nutrient status, which is going to give you problems. We know how to remove the nitrogen by continually cutting and removing the cuttings... I think the answer is yes, we do know the techniques. (Interviewee 1 - Blackmore Vale Case Study)

However, it is likely there will only be a limited need for the more radical restoration of improved land, as there is currently enough semi-natural land to restore with established restoration techniques. There is also an imperative to maintain a certain degree of landscape diversity. A bigger concern is with the lack of financial mechanisms to support the prescribed management/restoration options.

> We certainly know a lot about restoring grassland. I'm not sure about restoring arable, for instance, to grassland, but the question is do we want to do that. One of the problems we've got is the lack of diversity of farmland habitats. So many farms are now geared up to one system... so you've lost that diversity in the landscape. There used to be quite a lot of arable, which would have supported farmland birds and that's gone. (Interviewee 4 - Blackmore Vale Case Study)

- **Need for wider dissemination of habitat restoration knowledge**

It was suggested that there might be a greater need to disseminate existing habitat restoration techniques, rather than a need to conduct any additional primary research.

> There are an awful lot of people out there who think they've got to set about doing further research, when in fact it's all been done years ago and it's just that people don't do their literature searches properly, they reinvent the wheel. (Interviewee 1 - Blackmore Vale Case Study)

> This is all a new game. One thing the habitat restoration project did do was to at least get together all the references on what there was on habitat restoration so we have a lot more knowledge... This is such a wide field that we do need to have a better way of pooling information and getting even the most empirical sort of feedback very fast. (Interviewee 5 - Blackmore Vale Case Study)

> There has been quite a lot of research, but it's having that information more widely disseminated. Sometimes people have actually tried different techniques, but it's always a problem; you need to pull together all those experiences really. (Interviewee 3 - Blackmore Vale Case Study)

- **Shortage of skilled conservation contractors**

A shortage of skilled conservation contractors to carry out the specialist conservation work, coupled with a loss of traditional management practices, may become a significant barrier to the management of some habitats.

> It's finding the contractors that have the necessary skills really... because sometimes the contractors aren't up to the standards that we would require. Things like scrub management which is quite specialised: machinery is needed or people have to have more sensitivity when going onto sites with a high conservation value. (Interviewee 3 - Blackmore Vale Case Study)

- **Need for a directory of specialist contractors/suppliers**

One suggestion was for a directory of specialist contractors/suppliers offering the necessary skills and products, though it was pointed out that a directory of conservation contractors may already be in existence.

> Having a directory of contractors and specialists, although it could be difficult having that as you can't be seen recommending somebody over above somebody else, but it would be useful to have a list of the people who can offer those skills. (Interviewee 3 - Blackmore Vale Case Study)

- **Non-availability of correct grazing livestock**

The current shortage of grazing animals is considered to be a potential problem for the management of many semi-natural habitats.

> One of our big problems is going to be finding graziers. On two or three of my sites it's getting terribly difficult to find the kind of grazing we want... We've got to find a way of supporting the livestock industry, especially extensive grazing in a way that is compatible with the needs of the countryside. (Interviewee 5 - Blackmore Vale Case Study)

> It's also having the right type of stock. Most people will have cattle, but they may have store cattle, which aren't really terribly effective on pastures that need extensive grazing. (Interviewee 4 - Blackmore Vale Case Study)

> In the Blackmore Vale there aren't very many unimproved meadows left because they have been virtually all improved, so it's having the right sort of stock available to actually manage those sites, making sure they're grazed at the right time of the year and not overgrazed. (Interviewee 3 - Blackmore Vale Case Study)

A number of conservation organisation have even considered buying their own cattle to manage important grassland areas.

> I can't find any graziers; that's a major problem... It's an issue we need to address. We may try to address that by buying some cattle, which could be shared between organisations and moved around various sites; that could be a solution. Another consideration may be to use ponies, which might not be affected by BSE. (Interviewee 2 - Blackmore Vale Case Study)

- **Development of GIS based on aerial photographs**

The development of a geographical information system (GIS) based upon the aerial photographs of Dorset is intended to realise fully their potential as a valuable monitoring resource.

> I think aerial photographs, especially with the technology we have at the moment, could be used an awful lot more to get that basic survey... Whereas the Blackmore Vale survey got access to each piece of land and visited every single field, which is much more intensive and I don't think the quality is that different really... All of the aerial photo information is now on a GIS, and we're developing pioneering formulae for checking configuration of habitats using that data. (Interviewee 5 - Blackmore Vale Case Study)

8.4.2.4 Economic

- **Application of Countryside Stewardship**

The application and uptake of Countryside Stewardship has undoubtedly made a significant impact, in terms of securing the conservation of semi-natural habitats. It is often described as being responsible for more success than any other measure to date.

> Existing mechanisms, such as CS, are very valuable... Grant schemes and incentives are crucial for the implementation of BAPs. (Interviewee 2 - Blackmore Vale Case Study)

- **Competition for Countryside Stewardship**

The high demand for Countryside Stewardship and the overall shortage of money has led to the application of strict selection criteria. As a result there is concern that some strategic marginal sites may be missed, because of the intense competition for Countryside Stewardship. It is suggested that Countryside Stewardship has become a rather elitist scheme, which favours high-quality sites and neglects small, marginal sites with a restoration potential.

> Countryside Stewardship has been extremely disappointing through lack of funds...quite a few good schemes were turned down, which probably resulted in the loss of the grassland. They just haven't got enough money, and also the priority they give other targets is not benefiting biodiversity. (Interviewee 4 - Blackmore Vale Case Study)

> I believe I'm right in saying that FWAG were a little bit embarrassed, when a high percentage of CS applications were rejected - not because they weren't any good, but just because the pot didn't have enough money in it, which is a great shame. There were farmers out there who wanted to do something being turned down. (Interviewee 8 - Blackmore Vale Case Study)

> CS is not available to everybody... it's very tightly focussed down, to the degree you wonder whether it's worthwhile. To get into CS now, you've probably almost got to have a site of nature conservation interest. CS has almost becomes a rather elitist scheme: you happen to have got an area of very nice habitat; therefore, you can be considered for CS... I do think this is the biggest threat. (Interviewee 1 - Blackmore Vale Case Study)

However, recent increases in the overall sum allocated to Countryside Stewardship coupled with pre-application visits, to give people a realistic idea of whether their application is likely to be successful, is intended to improve the situation.

> Perhaps the greater funding for CS that's recently been announced will solve that. I hope so, because I don't think the smaller but good schemes should be penalised. (Interviewee 5 - Blackmore Vale Case Study)

- **Insufficient targeting of Countryside Stewardship**

The high competition for Countryside Stewardship and the difficulty in entering small, marginal sites, may be resolved by the further targeting of resources towards the smaller, strategic sites, perhaps based upon an indicative plan.

> I think because resources are so tight we do have to be much, much more focussed and much more proactive. It's a lovely idea that CS is there for any farmer who wants to do something for wildlife... but if we're going to achieve biodiversity targets we have to focus very tightly in on those areas where we can achieve the most for biodiversity (Interviewee 5 - Blackmore Vale Case Study)

Although, the lack of targeting is not considered to be a very significant issue as the application and targeting of Countryside Stewardship is already agreed in consultation with the various partners, which include English Nature, Dorset Wildlife Trust and the Environment Agency. Under the present system of scoring, sites do score more highly if they form part of a cluster of sites rather than being in isolation.

> In Dorset we're quite good at getting together as a group of conservation organisations and deciding what we'd like MAFF to target. So we often get target areas for CS, that everyone is happy with, and there is a reasonable amount of targeting towards things like buffer strips. (Interviewee 6 - Blackmore Vale Case Study)

> We have targeting meetings for CS... They'll put their targets on paper, and we'll say we want to change the priorities and we want to change the targets, because this would have more value than over there. There is a certain

> amount of liaison, but they're extremely rigid, very difficult to change. (Interviewee 4 - Blackmore Vale Case Study)

> If the proposed CS site links to other good habitats or other existing agreements, then obviously that gives it a higher weighting rather than looking at a site in isolation... It's no good converting a big area of land when you're not linking, buffering some other important habitat... you stand a better chance if you're adjacent to other habitats. (Interviewee 3 - Blackmore Vale Case Study)

- **Targeting benefits provided by the Blackmore Vale Habitat Restoration Project**

The Blackmore Vale Restoration Project has become an additional target area for Countryside Stewardship and applications falling within the project area receive higher priority, further directing resources to this important area.

> The Blackmore Vale is an additional target area for CS within Dorset... that was only due to FWAG and EN actually pushing that at the beginning of the project. So having that as a target area has certainly made a difference and certainly enabled more people to go into CS. (Interviewee 7 - Blackmore Vale Case Study)

This additional targeting of Countryside Stewardship, based upon an indicative plan, allows the proactive application of Countryside Stewardship rather than the usual reactive approach.

> I think the organisational policy is to respond to CS applications, which are put to them... But where you've got someone in the Blackmore Vale who goes out and encourages people to apply where they see opportunities, that was more productive, and that should be the case for the whole county. (Interviewee 4 - Blackmore Vale Case Study)

- **Need for higher incentives**

As the existing grant aid payment system is based upon a profit-foregone basis, there can only be small incentive element to encourage proactive work, and it is suggested the incentive element is unlikely to be enough to encourage people to change their ways.

> At the moment the main issues really are people having to think very hard about whether they can afford to do certain work; even with the current funding that's available, they've still got to find about 50% of the costs. So I think that's a big barrier, particularly things like stone wall restoration or other works like that. Where there isn't a strong agricultural benefit, it's more of a landscape thing. (Interviewee 3 - Blackmore Vale Case Study)

Many organisations would like to see a move away from this profit-foregone basis to a more targeted approach towards important habitats.

> If we need to make sure the landowners accept this grant, then maybe we need 100% grant and not 50%. So maybe we need to negotiate another kind of mechanism that does not exist at the moment. (Interviewee 2 - Blackmore Vale Case Study)

> You have to be careful not to be held to ransom by the farmer who's got that one bit of field that you really, really do want. The standard payment rates for CS made that a lot easier. Having said that, I think where we really, really, really do want something there should be an optional extra that we can pay, where they can really achieve the most for biodiversity. (Interviewee 5 - Blackmore Vale Case Study)

- **Lack of incentives for certain land types**

The apparent lack of grant aid schemes for particular habitats is considered a significant issue for conservation.

> For instance, arable land is not covered by Countryside Stewardship at all, and that's a great limit because most of the intensive farms in Dorset are arable... For example, our farmland bird project we targeted sites... mainly on mixed farms and the problems is where arable fits in... as those sites are not covered by CS. So we're in big trouble, as we don't know how to approach the landowners, because we need some other incentive. (Interviewee 2 - Blackmore Vale Case Study)

> Landowners most of the time are very sympathetic: they want to help, but they also need to support a business, and if we can't give them alternatives they're not going to support us because they need to live. So definitely grant schemes and incentives are crucial for the implementation of BAPs, and wherever they don't exist we need another way to do it. (Interviewee 2 - Blackmore Vale Case Study)

- **Lack of flexibility in Countryside Stewardship**

Countryside Stewardship was also criticised for a lack of flexibility, although others consider the scheme to be sufficiently flexible.

> Another issue may be the inflexibility of CS... you might find out that a landowner is particularly keen to do some habitat management, and this habitat management is not in the CS prescriptions, as such... It may help if there was more flexibility within the prescriptions. (Interviewee 2 - Blackmore Vale Case Study)

> I think the scheme is pretty flexible. There is flexibility in how you can use the scheme, with a bit of imagination, but because it is a proper scheme and it has to be audit proof... We do have the special project facility as well,

> which does allow you to do things that are more innovative. (Interviewee 3 - Blackmore Vale Case Study)

- **Lack of introductory grant aid scheme**

It was suggested that there may be a need for a lower entry level grant aid scheme that was quick, less bureaucratic, with lower thresholds and lower payments than existing schemes, to encourage more cautious, conservative farmers.

> It's a big step for a farmer to go into CS, when they haven't done anything in the way of habitat conservation, and there just isn't this interim step to get them in really. (Interviewee 5 - Blackmore Vale Case Study)

- **Dilution of Countryside Stewardship with the Rural Development Plan**

There is a concern that the Rural Development Plan will lead to the inclusion of further socio-economic issues, thus diluting the amount of money for biodiversity conservation.

> I suspect you're aware of the forthcoming Rural Development Regulation. One of the worries is that may stick more things into CS agreements than we know about at the present time, which may have the effect of diluting the money available for nature conservation. (Interviewee 1 - Blackmore Vale Case Study)

- **Shift to organic farming systems**

The increasing shift to organic farming is perceived as a significant opportunity for the conservation of the wider countryside habitats.

> I think it is finding an agricultural system that will support the management we're advocating, and we see organic farming as one of the main forces for that... The types of stock that will do well under an organic system are more suited to the pastures that we have in west Dorset. (Interviewee 4 - Blackmore Vale Case Study)

> The opportunities for organic systems have really come to the fore in the last couple of years. I think people are beginning to realise that it adds value to land, which would be regarded as marginal. (Interviewee 4 - Blackmore Vale Case Study)

> You can actually deliver a lot for biodiversity through organic systems. It's not only the reduction on inputs; it's diversification of the cropping regime. (Interviewee 4 - Blackmore Vale Case Study)

> I've certainly noticed there's quite a few that have actually gone into organic conversion in the Blackmore Vale, particularly with dairy farms because of the higher payments on the milk... In the Blackmore Vale, because of the nature of the soil and the grass growing, organic farming fits in very well

> because you don't actually need much fertiliser. (Interviewee 7 - Blackmore Vale Case Study)

- **Local markets**

There is currently a move to promote the value of local markets to sell high-quality products produced by an extensive farming system. It is often stated that conservation in the wider countryside is often reliant on the viability of small-scale extensive livestock farming. It is also claimed that these locally distinctive products will have a greater value, particularly within the local economy:

> I think there will be more and more local markets supplied by local producers, and possibly we'll see the industry split with big-volume commodity producers supplying the big-volume commodity markets, and smaller units aligning themselves very much more with local markets. One thing that's been coming out of these farmers' markets is that there is a serious shortage of fruit and vegetables, because we don't produce much in Dorset. (Interviewee 8 - Blackmore Vale Case Study)

The idea of local markets is well supported by farmers and the local community, but it is suggested that it may well be a niche market that is limited by what people can really afford, and their positive impact may have been overestimated by conservation organisations. It particular, it is suggested that local markets will only have a limited impact on the diary farms of the area, as milk is not a commodity that lends itself to farmers' markets very well.

> I think at the moment it's more of a niche market, but there's certainly the potential. If there were more encouragement and financial incentives there would be more. (Interviewee 7 - Blackmore Vale Case Study)

> I don't think it's a niche market at all. I think it's going to be important, because people are prepared to pay a little bit extra for a premium product... The area was fairly affluent already, but with the decline in agricultural incomes, we're seeing more and more farms being sold to people who are moving out of London and the South East. They are demanding high-quality produce, and it's just tapping into that... There are enough wealthy people around... Bridport Farmers' Market has just taken off beyond anyone's expectations. (Interviewee 4 - Blackmore Vale Case Study)

> Farmers' markets don't have a major application to the majority of dairy farmers in this area, because it's very difficult for a dairy farmer to bring a milk tanker to a market and put a tap on the back and let people fill their bottles from it! It's much easier to get an animal slaughtered and have slabs of meat, or to rear chicken and bring in eggs. Milk is not a commodity that lends itself to farmers' markets very well. That having been said, there are people out there who are participating in farmers' markets and there will be

> more; they have their role and they have a nice image and it's good public relations. (Interviewee 8 - Blackmore Vale Case Study)

- **West Dorset Food Links**

The West Dorset Food Links is a local scheme, which is trying to promote the benefits of local markets.

> There's a lot of interest in local food schemes. We have the West Dorset Food Links, which is trying to promote the availability of locally produced food, through farmers' markets and co-ops. (Interviewee 4 - Blackmore Vale Case Study)

- **High capitalisation on modern dairy farms**

The increasing pressure on the modern highly capitalised dairy farm, to convert every bit of permanent grassland to the most productive sward, is considered to be a major barrier to conservation.

> Because of the way dairying is in this country, it's a capital-intensive system. It depends on getting the most out of your grass, the most out of your cow, the most out of your dairymen, the most out of everything to run a profitable dairy. The size of dairy that used to be profitable 2-3 years ago is just not viable any more. People who could quite happily manage with 80 cows are now talking about needing 140. All the time the ratchet is going up, and it's going in the opposite direction to what we need it to move. There is tremendous pressure to convert every bit of permanent grassland to the most productive sward that you can get. (Interviewee 5 - Blackmore Vale Case Study)

> I'm dealing with one farm at the moment...it's a traditional family dairy farm that has an SNCI... He has not managed it intensively in the past, but he is saying to me 'the only way I can keep my head above water now, is to increase the number of dairy cows. I therefore need to fill in the humps and bumps on the SNCI, level it out, plough it up to grow rye grass, in order to support the extra cows'... So that is a very, very serious constraint, I understand what the guy is saying to me, but I'm hoping we've arrived at a compromise. (Interviewee 1 - Blackmore Vale Case Study)

- **Application of woodland grants**

A range of woodland grants, such as the Woodland Grant Scheme, provides a significant financial opportunity to establish and manage woodland. However, there is a concern that the existing grant aid schemes may be unable to cover the cost of the expensive restoration phase, which may be necessary, as many of the woods have been unmanaged for a long time.

> Dorset woodlands are not perhaps the most conspicuous habitat in the county... but the Blackmore Vale is a well-wooded area; it's part of the old hunting forest... and there are lots of small copses and blocks of woodland still left. Although the management initiatives in them hasn't progressed as far as our neighbours in Hampshire and Devon (Interviewee 5 - Blackmore Vale Case Study)

> A lot of these woods have seen no management for such a long time, that they'll almost need to go through a restoration phase in order to improve the conditions for producing timber in the future, and it's how we cover the cost of that restoration. To do that we have to look at the grant scheme and try and get as much out of that, and also improve the value of the underwood that is coming out. (Interviewee 4 - Blackmore Vale Case Study)

- **Application of Challenge Funding for woodland improvement**

There is a highly significant opportunity, under the Challenge Funding Grant, to provide 100% funding for woodland improvement. It is suggested that this is currently the only mechanism to secure proactive woodland management.

> We also were able to secure Challenge Funding for small woods in Dorset. So we're able to provide 100% funding for woodland improvement, which is the only way it's going to happen at the moment. We've managed to create habitats for marsh fritillaries in woods, to connect, link and extend significant marsh fritillary areas, under the Woodland Challenge Grant and that's been successful. (Interviewee 5 - Blackmore Vale Case Study)

- **Lack of markets for woodland products**

The loss of traditional woodland markets is often criticised as the main factor behind the decline in active woodland management.

> In forestry at the moment it's very difficult to get the kind of management we want in the woods, because there are such low profit margins in forestry, because of the green pound... and the loss of traditional management practices such as coppicing. (Interviewee 5 - Blackmore Vale Case Study)

> The forestry industry is not geared up for the processing of English hardwood at the moment, particularly the lower grade hardwoods... It's also trying to link users of wood in the county, such as joiners and builders, and get them to consider locally produced timber. There just hasn't been an industry there for so long, apart from the big FC estates. (Interviewee 4 - Blackmore Vale Case Study)

- **Appointment of County Woodland Officer**

The recent appointment of a County Woodland Officer is intended to assist woodland managers in applying for grant aid and examining ways of marketing their products.

> We're trying to get a greater awareness of the markets and of the grant system, for maintaining and supporting the work in these woodlands...That has led to the appointment of a County Woodland Officer, which has been a great opportunity... We hope the Woodland Officer will help with drawing up WGS applications... There is currently a lack of someone to fill in WGS applications for farmers. The large estates tend to employ a forestry agent and it's worth their while... but a small farmer is unlikely to lay out money to get someone to do their WGS application. (Interviewee 5 - Blackmore Vale Case Study)

- **New 'incomers' paying for habitat management**

There is a suggestion that some 'incomers' may actually buy land for its conservation value, and that they may be prepared to put their own money into habitat management, being led by conservation organisations.

> New incomers can actually sometimes be a force for good... you occasionally come across people, perhaps the incomers, who are actually prepared to put a bit of money in and do it themselves, but one certainly can't take that for granted... A vast amount of people buying up land in Dorset, who've got vast sums of money derived from the city, don't actually want, or really need, to go out and farm it intensively. They may very well want it for its conservation value... We do know that some of the land agents market the fact that the property has an SNCI. (Interviewee 1 - Blackmore Vale Case Study)

> They are extremely keen and quite often in these situations, because their career or business is something totally unrelated, they actually have more money available to put in to things like looking after it or actually doing more measures than a farmer would. Sadly, a lot of it comes down to the money. (Interviewee 7 - Blackmore Vale Case Study)

- **Partnership funding of projects**

A number of conservation projects receive financial support from a range of organisations; for instance, the Blackmore Vale Habitat Restoration Project receives funding from both English Nature and the Environment Agency.

> When we support projects like the Blackmore Vale project, we can steer it and we can put in funds, guidance, advice and we can provide leaflets and all that kind of stuff... We've also provided funding for some of the habitat enhancement work... In terms of collaboration between the organisations we're quite good and we're generally involved with stuff that is proactive. (Interviewee 6 - Blackmore Vale Case Study)

8.4.2.5 Social

- **Advisor field visits**

Advisory field visits play a highly important role in conveying management knowledge, securing conservation agreements and raising the awareness of the farming community, but these important field officers have very limited time and resources and are unable to visit all interested parties.

> The provision of advice is absolutely essential - unless it's publicly owned land you can't expect to go and create habitats, or change the management of them, without working with people that actually own or manage that land. Ultimately it comes down to their willingness to do it and without that you wouldn't get it done on the ground. (Interviewee 7 - Blackmore Vale Case Study)

> Obviously having the incentive payments does make a big difference; also part of that is actually having people who are there to give out advice - I think that's just as important. Because even if they decide not to go ahead at least there has been somebody who's been over to see them about ideas and what the potential is. Sometimes people don't realise that they have got something special on their farm, or that there are these enhancement opportunities available. I think that's one of the main positive things. (Interviewee 3 - Blackmore Vale Case Study)

> I suppose the other opportunities really are about awareness; it's about making sure the farmer is actually aware of what he's got, and why it is special... When they found the need for an advisory officer they asked me if I would find some time and do this sort of work, and that's been going on for six or seven years... but there is never actually quite enough time to do everything and we're very stretched indeed... There is a need for more people on the ground. (Interviewee 1 - Blackmore Vale Case Study)

- **Lack of staff continuity**

Concern was expressed about the high degree of staff turnover and the lack of staff continuity. It is suggested that the lack of staff continuity can affect the development of important relationships between advisors and the farming community.

> I think that's a common problem in conservation as a whole: it's such a shame. Most of these jobs are contracts whether for two years, etc. As soon as a community like the Blackmore Vale gets used to one person being their contact it changes... It's such a common saying from people on the ground that 'there's so many of you and we don't know who to go to; you change all the time'. (Interviewee 7 - Blackmore Vale Case Study)

> I think that is important. Relationships are important for farmers; you have to earn their trust, and once you've earned it you enjoy it and the benefits of it, but they can be a very suspicious lot when they want to be. Every time a

> new young face walks on the scene, straight out of college with their environmental science degree, you've got to start again from scratch. So, yes, continuity of people is important. (Interviewee 8 - Blackmore Vale Case Study)

- **Need for a 'one-stop shop' / single point of contact**

The multiple involvement of various conservation organisations in wider countryside conservation, although necessary, may be confusing for many farmers and landowners. It is widely accepted that a 'one-stop shop' or a 'single point of contact' might act as a focal point between the various partners and the farming community, who view the various organisations as rather amorphous and murky. It is also suggested that a 'one-stop shop' approach could aid the communication and co-ordination of the various organisations, to ensure they complement, rather than duplicate, each other.

> It confuses people terribly; it makes communication terribly important... certainly the feedback we get from farmers/landowners, is that they'd much prefer to deal with one person. It's obviously an advantage if you get lots of different specialists rather than expecting one person to know everything, but I think there is an advantage of having just one person the farmer has to talk to, and then they go off and talk to different experts. (Interviewee 5 - Blackmore Vale Case Study)

> I think a lot of farmers actually appreciate a face-to-face contact, and it's someone they can go back to and know that they'll be there in six months time, and they'll get a consistent level of advice. The complaint I often get is that they have too many advisors, and they give up. It's really important that there's like a one-stop shop almost. I think that if they had one point of contact they might think it's worth them bothering to phone up or meet on site... I think it needs one person who can concentrate on an area, like the Vales, and almost go out and proactively talk to people. (Interviewee 4 - Blackmore Vale Case Study)

- **Benefit of single point of contact in the Blackmore Vale Habitat Restoration Project**

It is widely accepted that the single point of contact approach, adopted in the Blackmore Vale Habitat Restoration Project, has made a remarkable difference in overcoming the confusion of the multiple involvement and developing strong working relationships with the farming community.

> To have one point of contact has made an incredible difference. It's a very typical saying from farmers and land managers: 'oh there's so many things going on, you don't know who to turn to'... Quite often they get approached from all these different organisation and they just see it as so many, and it does put them off in a lot of situations, particularly in an area like that. (Interviewee 7 - Blackmore Vale Case Study)

> Having a single project officer in the Blackmore Vale is a really positive thing, because I think landowners can associate with one person, and they know where to go and they have a focal point. (Interviewee 6 - Blackmore Vale Case Study)

- **Publications**

Several publications and leaflets have been produced to increase the awareness of conservation issues in the wider countryside.

- **Mistrust/suspicion of conservation organisations**

Although most landowners are generally sympathetic towards conservation issues, there is a certain degree of mistrust and suspicion towards conservation organisations, which can make it difficult to convince people to adopt changes in their management practices.

> There is amongst the farming community out there, who I love dearly, considerable resistance. Blinkered vision conservationists with a passionate mission with zeal for their particular subject coming on to a farm and dictating to a farmer what he should and shouldn't do. There is considerable 'anti' feeling in the farming fraternity of people coming on the farm and saying 'you must do this, you must do that'. Particularly when those people may not have any farming knowledge or understanding, so they can't understand why the cows are left in or out, or whatever. (Interviewee 8 - Blackmore Vale Case Study)

> I think it's very much less now than it was; just occasionally you get the odd blip. I was promoting the meadows and pastures option and I left a message on one person's answer phone, which in retrospect was probably a bit of a mistake. When he rang back and told the receptionist that he wasn't interested and wanted nothing to do with the DWT or any of its schemes. That was an unusual and bad blip, and I don't know why that was. (Interviewee 1 - Blackmore Vale Case Study)

In recognition of the sensitivity concerning conservation issues the Blackmore Vale Habitat Restoration Project adopted a very 'softly, softly approach' working closely with the Farming and Wildlife Advisory Group.

> One of the very positive things about the Blackmore Vale project was that it was managed through FWAG, which is an organisation set up very much to bridge those sorts of gaps... They know the farming side of things, they know the conservation side of things as well, and are very good at marrying the two and finding a middle ground which recognises the needs of both sides. (Interviewee 8 - Blackmore Vale Case Study)

- **On-farm demonstrations**

The use of on-farm demonstrations is being promoted to provide evidence of what can actually be achieved for conservation within a viable farming system, thus providing greater credibility. It is suggested that they will be particularly helpful for people who are in agreements or who may be considering an agreement.

> I would sooner do more on promoting on-farm demonstration days, whereby you identify a farmer who is doing what you want to demonstrate really well... We actually did this: our first one was only a month ago, and we did it very successfully just outside Dorchester, combining our own knowledge with the expertise of the Game Conservancy, and the Hawk and Owl Trust. We used this as an occasion to bring MAFF and FRCA officials on to the site, so they were able to talk to farmers in an informal basis, within relaxed surroundings. It worked jolly well and I'd support those kinds of demonstrations... It actually gives it greater credibility: the farmers can't go away and say 'oh well. It's OK for the DWT they've got pots of money'. (Interviewee 1 - Blackmore Vale Case Study)

However, others regard the opportunities offered by on-farm demonstrations to be quite limited, as the farms are often run by conservation enthusiasts which are often regarded as being on the fringe of the farming community.

> It's a very nice idea but you'd need a very dedicated farmer who would be prepared to do that... Most of the people who have done habitat restoration tend to be people who are very, very interested in nature conservation... and they are perhaps seen as rather fringe by the main farming community. You really do need perhaps rather a much more orthodox farmer to demonstrate habitat restoration. (Interviewee 5 - Blackmore Vale Case Study)

- **Formation of Dorset Woodland Forum**

The need for greater awareness of woodland markets and the grant aid system has also led to the formation of the Dorset Woodland Forum, which is regarded as a moderate opportunity.

> The Dorset Woodland Forum is certainly working to improve the woodlands in Dorset as a whole, but to encourage people to manage woodlands they have to have an outlet - they have to be able to sell the timber and the logs. They need that market to be available; they need the contacts, who to go to; it's actually providing a link, so something like the Forum is one initiative that's actually starting. (Interviewee 7 - Blackmore Vale Case Study)

> The forestry industry is not geared up for the processing of English hardwood at the moment, particularly the lower grade hardwoods. It's something that we're tackling through the Woodland Forum, which was set up last year. (Interviewee 4 - Blackmore Vale Case Study)

- **Lack of public awareness**

It was considered moderately important to raise the awareness of the general public through interpretation boards, talks, leaflets and country walks.

> It's very important that the taxpayer understands the wonderful value they get. The importance of nature conservation will never go up the political agenda without bringing the people with us; we need hearts and minds, we want everybody to be involved in nature conservation, whoever they are and whatever their walk of life. (Interviewee 5 - Blackmore Vale Case Study)

> What we're trying to get, say along every popular footpath, is a couple of signs, even if it's to say 'the woodland on your right is being managed to benefit such' - just a couple of simple sentences so they're actually aware. (Interviewee 7 - Blackmore Vale Case Study)

However, it was emphasised that the success of much conservation work in the wider countryside is still largely reliant on the attitudes and co-operation of the key landowners, farmers and foresters, which are often dependent on the wider economic issues. Further, it was suggested that it would be useful to put into context what the farmers are doing and to emphasise positive aspects, as the message that people receive is a fairly negative one.

> Quite often the general public are perhaps unaware of the details of farming and don't know what's involved with it, and with the stories that come out in newspapers, they can get a very distorted view of actually what's happening. Even to the point where the public will see a hedge that's just been laid and they'll actually complain to the local papers they've decimated that hedge, because they don't actually understand what is being done. I don't want to be rude to these people but a lot of the public are unaware of how these habitats are managed. Quite a few farmers I've spoken to are keen that the general public understands or appreciates what they are doing something, and what they're doing is to look after it. (Interviewee 7 - Blackmore Vale Case Study)

- **Change in farm ownership - intensification as small farms bought by adjacent farms**

There is considerable concern about the structural changes in farm ownership, as the current agricultural economy has led to rapid changes, with farms being sold to adjacent farms and 'incomers'. It was suggested that these changes in ownership might lead to further intensification, as when a larger farm buys a small farm they may possibly have to intensify production to cope with the increased financial commitment.

> The downturn in farming, particularly in the dairying areas of the Vales, has led to the break up of these small family farms... These small family farms are suddenly no longer viable because of the collapse of the milk prices. As a result one of two things will happen. The dangerous thing that can happen is that there are still a few very successful farming families who with their expertise and their need to provide for expanding families. Those people can be a considerable threat to nature conservation, because they're still having to pay a lot of money for the land. The land is fetching an astonishing price still it almost defies reason. So immediately they want to get rid of some of the hedges and they may want to plough up the old meadow, what have you, and that's a very serious threat. The other thing that can happen, and again it's not necessarily good, but we've got many, many example of farmers who give up farming themselves, but just let the keep to other farmers. Again, they're trying to maximise their income, so they let it to a farm for say £100 per acre; that chap has paid £100 and he's got to get a return on that money so he'll chuck some fertiliser on, which is not what we want. I do perceive that as another threat. (Interviewee 1 - Blackmore Vale Case Study)

- **Changes in farm ownership - neglect as small farms bought by new 'incomers'**

These changes in farm ownership may also lead to neglect, as quite significant areas of land are no longer be owned or managed by commercial farmers.

> One thing that the NFU rep for the area has really identified as happening in the last year is that lots of people are buying up land around their big houses - city incomers you might call them. With the idea that someone is going to manage their land for free and finding that farming isn't actually profitable and it's very difficult to actually get those bits of land managed now. Perhaps we will see more land just absolutely neglected, I don't know. (Interviewee 5 - Blackmore Vale Case Study)

However, as previously mentioned, an economic opportunity may exist where the new 'incomer' may be prepared to put their own money into habitat management.

> There is considerable evidence that units, which are currently going on the market, are very often being split and part going to the neighbouring farm and part going to somebody that wants the house... We've seen several circumstances in the last two or three years, where the whole farm's been bought by city money, and I've had a phone call six months latter saying 'what do I do with 200 acres' literally... The problems in those situations are that they don't know what to do, so perhaps it's a problem and an opportunity. They are not practised land managers. Perhaps it's an opportunity because from a position of total ignorance they can be trained, led and encouraged. Again many of them have a nice rosy image of what life is like in the country, and will be persuaded to re-plant wildflower meadows, rather than having to get so many tons of grass off it. (Interviewee 8 - Blackmore Vale Case Study)

8.4.2.6 Political

- **Adverse state of agricultural economy - neglect**

The adverse state of the agricultural economy may lead to the neglect of some less productive areas, which are dependent on a viable grazing regime.

> We have more people, particularly in the last couple of years, actually leaving farming altogether. A lot of farms have been broken up, and been bought by second homeowners or adjacent farms. That's happening more and more frequently. (Interviewee 4 - Blackmore Vale Case Study)

> Because the situation farming finds itself in, there are not necessarily enough animals around to graze it. So you're actually creating something for which there isn't a demand, in agricultural terms. Hopefully, it will eventually get reversed, but there's no sign of that at the moment. (Interviewee 1 - Blackmore Vale Case Study)

- **Adverse state of agricultural economy - intensification**

On the other hand, the agricultural economy may lead to the further intensification and loss of these less productive areas. The Blackmore Vale has a lot of small dairy farms and a drop in milk prices makes it far more difficult for them a make a living, so they have to look at other options for maximising their income such as intensification.

> We've actually found out that 20% of the trial area is arable now, which is a huge increase on what I thought it was a few years ago and what the farmers say. We put this down mainly to maize silage as well as the pressure to use any land that's registered for cereal, because the arable area payments are so good. Farmers are now also under increasing pressure to try and reduce their own food bills, so they will be taking silage as much as they can, whereas, previously it would have been a much gentler hay regime. (Interviewee 5 - Blackmore Vale Case Study)

- **Adverse state of agricultural economy - change in stocking regime**

There is also considerable concern the agricultural economy may cause a change in the grazing regime, which is necessary to manage many of the important habitats. It is claimed that many farmers have now given up on beef farming.

> One of our big problems is going to be finding graziers. On two or three of my sites it's getting terribly difficult to find the kind of grazing we want. We used to have the Welsh tack sheep, but people aren't bothering now because they're just throwing away money with all the livestock that they're keeping. We've got to find a way of supporting the livestock industry, especially extensive grazing in a way that is compatible with the needs of the countryside. (Interviewee 5 - Blackmore Vale Case Study)

- **Attachment of environmental conditions to agricultural subsidies**

The attachment of environmental conditions to agricultural subsidies is considered to be a major opportunity for the conservation of semi-natural habitats in the wider countryside.

> I think we have to look at cross compliance, really now, and that's something that we can bring in unilaterally. People argue the farmers are getting support. I know the milk prices are rock bottom, but the tax payers are still supporting farmers, and we really do need cross compliance to make sure that at least no more semi-natural habitat are lost. (Interviewee 5 - Blackmore Vale Case Study)

- **Need to move from agricultural production payments to area payments**

It is suggested that there is a need to move away from production-orientated subsidies to area-based payments.

> The main problem is the production demands of agriculture... Agenda 2000 was so disappointing: they might have switched dairy to area payments, which could have reduced the pressure for increased headage, but it just didn't happen... I think we have to look at some way of getting area payments rather than production-orientated subsidies. But as the dairyman is entirely orientated towards the amount of milk they can produce from each cow, all we can hope to do is to somehow protect these hedges and look at the bits where the farmer isn't getting so much production. (Interviewee 5 - Blackmore Vale Case Study)

> A lot of the payments are production-based payments, and really a lot of these stem from the War, which was applicable then when we had to look at producing more food. It's taken a long time to start moving away from that side of it; there's certainly a move to try more for cross-compliance, so they have to be environmental benefits achieved in relation to the subsidies. (Interviewee 7 - Blackmore Vale Case Study)

- **BSE crisis**

The BSE crisis has further threatened the viability of beef farming, with the introduction of the 30-month rule. These semi-natural habitats, such as unimproved and semi-improved grasslands which are often reliant on beef farming for their management, are fairly unproductive and it is often difficult to get stock to a sellable size within the 30-month period, leading to the under-grazing and neglect of some sites.

> We have more people, particularly in the last couple of years, actually leaving farming altogether, or moving away from beef and sheep... that's happening more and more frequently now that the beef crisis is beginning to bite. (Interviewee 4 - Blackmore Vale Case Study)

- **Introduction of the Rural Development Regulation**

It is suggested that the Rural Development Regulation will bring major opportunities for conservation in the wider countryside by bringing together social, economic and environmental issues.

> The rural development regulation, I would hope would bring opportunities for bringing together social, economic and environmental things in the countryside. For instance, the marketing issues would come under that. There are huge opportunities... but how long they will take to evolve I don't know. (Interviewee 5 - Blackmore Vale Case Study)

- **Development pressure**

It is widely accepted that there is only a slight threat from development pressure in the Blackmore Vale, although there is a strong development threat for habitats in the south of Dorset, from the conurbation in the south east.

> In Dorset, but away from the Blackmore Vale, we suffer from very strong development pressure from mainly the conurbation in the south east - Bournemouth, Christchurch - which is surrounded by internationally important habitat, both on the lowland heaths and marine, coastal areas. That leads to very heavy development pressures and, although the development tends to be contained away from the best sites now because of legislation, there are fringe actives continually threatening to damage the heathland. (Interviewee 5 - Blackmore Vale Case Study)

- **New Forestry Strategy**

It is believed that the England Forestry Strategy (Forestry Commission, 1998) will have positive benefits for woodlands.

> I think on the forestry side, the new Forestry Strategy and the devolution of the Forestry Commission, will certainly have positive benefits... Broadleaf woods have got so many planning policies protecting them with the new Forestry Strategy and the work that goes with that and the grant schemes. (Interviewee 4 - Blackmore Vale Case Study)

- **Woodland Assurance Scheme**

The introduction of the Woodland Assurance Scheme should provide benefits for the marketing of woodland products and the associated management of woodlands. However, it is acknowledged that the process of certification is quite an expensive process, because it is the management of the woodland which is certified rather than the site itself, which may deter certain producers from seeking certification.

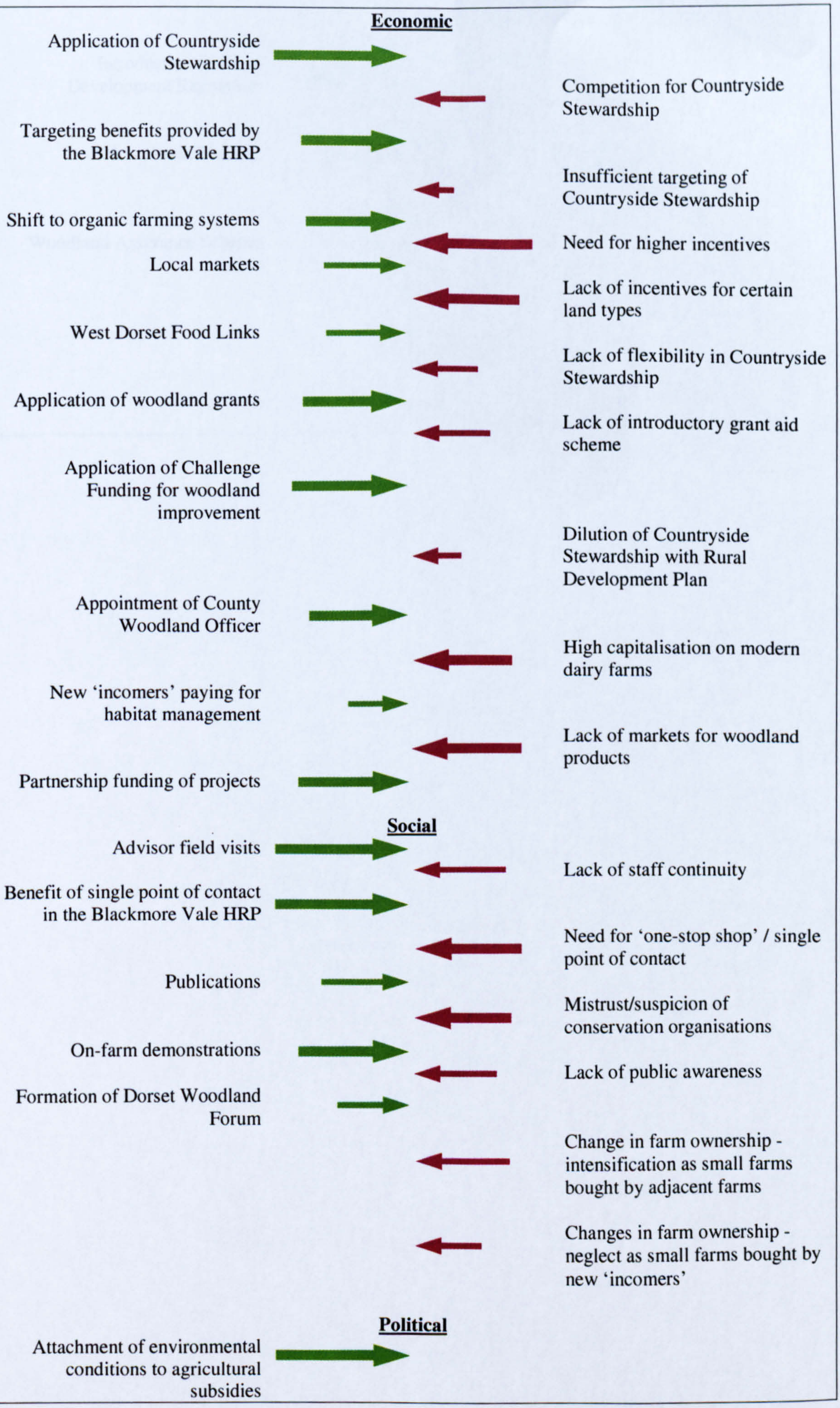
> Certification under the Woodland Assurance Scheme is becoming more important now... It's something that we are going to be promoting, but it is quite an expensive process to go through... In Europe they're much further ahead with certification than we are, so we've now got companies in the Vales, which were using locally produced timber, but now the people who they supply, like B&Q, will only buy certified timber they're having to import from Sri Lanka.

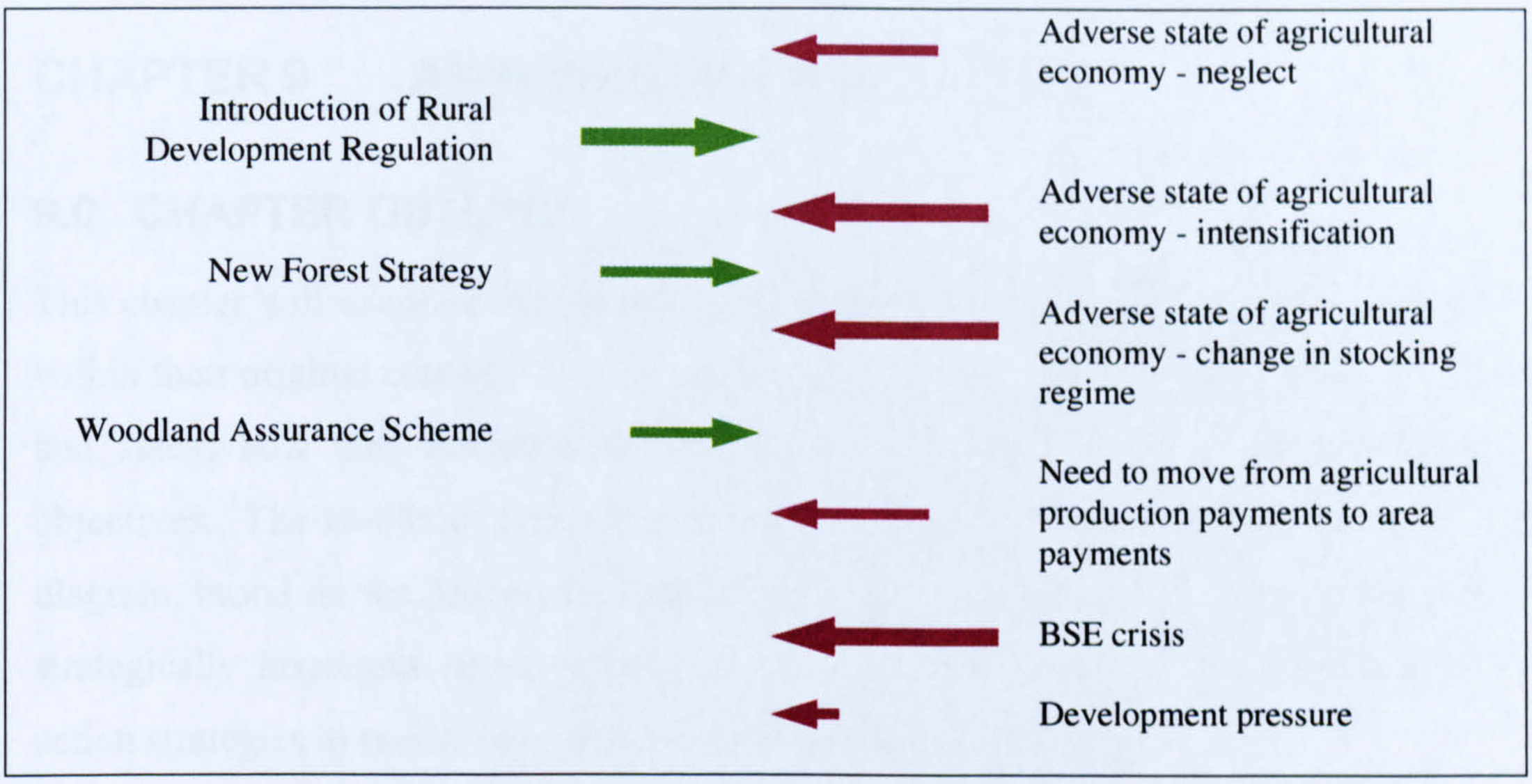
8.4.2.7 Force Field Analysis of Results

The arrows in the following table represent the significance of each opportunity and barrier, as calculated from the mean scores in Appendix 4. For clarity the thick green and red arrows represent the 'most significant' opportunities and barriers, respectively, with a mean score of 3.5 or greater, whilst the thinner green and red arrows represent the 'less significant' forces with a mean score of under 3.5.

Table 8.3 - Identification of 'opportunities' and 'barriers' affecting the conservation of semi-natural habitats within the Blackmore Vale, Dorset

OPPORTUNITIES ***Positive Driving Force***		**BARRIERS** ***Negative Restraining Force***
	Agreement	
Partnership approach	→	
	←	Poor communication between partners
Communication benefits from field meetings	→	
	←	Need for co-ordination of partners/projects
Co-ordination/communication benefits provided by the Blackmore Vale HRP	→	
	←	Lack of co-ordination of Biodiversity Action Plans
	←	Lack of consensus on woodland restoration techniques
	Knowledge	
	←	Lack of specific habitat/species knowledge
	←	Lack of knowledge of marginal sites
	←	Poor co-ordination of knowledge
	←	Lack of monitoring
	←	Lack of habitat management knowledge
	←	Lack of knowledge about changes in farm ownership
	Technology	
Indicative planning pilot project - Blackmore Vale HRP	→	
	←	Absence of indicative planning
Indicative planning pilot project - 'Unconscious project' by DWT	→	
	←	Lack of established habitat restoration techniques
Development of GIS based on aerial photographs	→	
	←	Need for wider dissemination of habitat restoration knowledge
	←	Shortage of skilled conservation contractors
	←	Need for a directory of specialist contractors/suppliers
	←	Non-availability of correct grazing livestock


Economic
Application of Countryside Stewardship
Competition for Countryside Stewardship
Targeting benefits provided by the Blackmore Vale HRP
Insufficient targeting of Countryside Stewardship
Shift to organic farming systems
Need for higher incentives
Local markets
Lack of incentives for certain land types
West Dorset Food Links
Lack of flexibility in Countryside Stewardship
Application of woodland grants
Lack of introductory grant aid scheme
Application of Challenge Funding for woodland improvement
Dilution of Countryside Stewardship with Rural Development Plan
Appointment of County Woodland Officer
High capitalisation on modern dairy farms
New 'incomers' paying for habitat management
Lack of markets for woodland products
Partnership funding of projects
Social
Advisor field visits
Lack of staff continuity
Benefit of single point of contact in the Blackmore Vale HRP
Need for 'one-stop shop' / single point of contact
Publications
Mistrust/suspicion of conservation organisations
On-farm demonstrations
Lack of public awareness
Formation of Dorset Woodland Forum
Change in farm ownership - intensification as small farms bought by adjacent farms
Changes in farm ownership - neglect as small farms bought by new 'incomers'
Political
Attachment of environmental conditions to agricultural subsidies


Adverse state of agricultural economy - neglect
Introduction of Rural Development Regulation
Adverse state of agricultural economy - intensification
New Forest Strategy
Adverse state of agricultural economy - change in stocking regime
Woodland Assurance Scheme
Need to move from agricultural production payments to area payments
BSE crisis
Development pressure

CHAPTER 9 ANALYSIS OF CASE STUDIES

9.0 CHAPTER OUTLINE

This chapter will examine the opportunities and barriers identified from the interviews within their original context. It will analyse the sequence in which they appear to occur and assess how they facilitate or hinder the achievement of the wider countryside objectives. The results of the analysis lead to the construction of a problem pathway diagram, based on the sequence proposed by Trudgill (1990). This process highlights strategically important areas, which in turn provide a focus for the development of action strategies to reinforce opportunities and surmount barriers.

For clarity, the bold green and red typefaces, used in the diagrams, represent the 'most significant' opportunities and barriers, respectively (i.e. those with a mean score of 3.5 or greater), whilst the normal green and red typefaces represent the 'less significant' forces. The detailed diagrams are intended to be read in conjunction with the supporting texts, which identify the opportunities and barriers by italic type.

9.1 CULM PROBLEM PATHWAY

The Culm problem pathway, illustrated in Figure 9.1, can be divided into two distinct sections based on the wider countryside objectives set out in Section 6.1.2: the first is concerned with the maintenance and improvement of existing habitat fragments (the first wider countryside objective); whilst the second section deals with the second objective, concerned with the reconstruction of connecting and buffering areas.

Wider Countryside Objectives / Problem Solving Sequence	Maintenance & Improvement of Habitat Fragments		Reconstruction of Connecting & Buffering Areas		
Problem Recognition	**Large, high-quality sites** ***Knowledge*: Culm Grassland inventory**	**Small, lower quality sites** ***Knowledge*: Lack of knowledge of marginal sites** *Knowledge*: Limited advisor ability to identify marginal sites	**Prioritisation of areas** ***Technology*: Absence of indicative planning**	**Research restoration techniques** *Technology*: Lack of established habitat restoration techniques	
Problem Acceptance	***Agreement*: Culm partnership approach** *Agreement*: Poor communication between partners *Agreement*: Poor co-ordination of partners *Economic*: Funding of joint projects	***Agreement*: Lack of agreement over responsibility to survey Torridge area** *Agreement*: Forestry planting on Culm Sites		***Technology*: Habitat restoration pilot projects**	
Resolution Proposal	**Support of Culm agricultural system** ***Political*: Adverse state of agricultural economy** *Political*: BSE 30-month rule; Social: Change in ownership		**Further target conservation efforts** *Technology*: Indicative planning pilot project - Torridge Headwaters Project	**Restoration of agricultural land**	**Restoration of forestry land**
Resolution Acceptance	*Economic*: Adding value to Culm products *Social*: Limited public appreciation and awareness *Economic*: Purchase of Culm sites	***Economic*: Application of Countryside Stewardship**	***Economic*: Competition for Countryside Stewardship** *Economic*: Insufficient targeting of CS *Economic*: Lack of introductory grant aid scheme	*Agreement*: Uncertainty over THP objectives	***Economic*: Lack of funding mechanism for restoration work** *Social*: Negative owner attitude	*Agreement*: Habitat restoration on forestry sites
Resolution Implementation	***Social*: Advisor field visits** *Knowledge*: Limited advisor knowledge of farming systems ***Social*: Publications - Culm Connections** ***Social*: Best practice demonstration sites** *Social*: Farm events *Knowledge*: Incomplete habitat management knowledge *Technology*: Non-availability of correct grazing livestock		*Social*: Limited awareness of marginal site owners *Social*: Absence of a 'one-stop shop' *Knowledge*: Limited advisor ability to apply CS to marginal sites		
Problem Resolution	**67% of Culm Grassland *area* in agreements** **38% of Culm Grassland *sites* in agreements** *Knowledge*: Limited site monitoring				

Figure 9.1 - Culm problem pathway

9.1.1 Maintenance and Improvement of Existing Habitat Fragments

The analysis of the opportunities and barriers affecting the achievement of the objective 'to maintain and improve the existing habitat fragments', distinguishes between those impacting upon large, high-quality sites as opposed to smaller, lower quality sites.

- **Problem Recognition**

The problem facing Culm Grassland has been identified by the extensive *Culm Grassland Inventory*, which is widely regarded as a significant conservation opportunity. However, as the inventory focussed on larger, high-quality sites, there is an evident *lack of knowledge of the more marginal sites*, especially the smaller, lower quality sites, which may have restoration potential. A sound knowledge of these latter sites is necessary to take forward the conservation of Culm Grassland, by extending, linking and buffering existing habitats. The lack of knowledge of marginal sites is also exacerbated by the concern over the *ability of certain field advisors to identify marginal sites* with a restoration potential.

- **Problem Acceptance**

The information provided by the Culm Grassland Inventory led to the establishment of the *Culm conservation partnership*, considered to be one of the most significant opportunities, which suggests a general acceptance of the problems facing Culm Grassland. The dependency on this partnership approach also indicates the importance of maintaining the *communication* between, and the *co-ordination* of, the multiple organisations involved, although these are not considered to be major issues at present.

The *funding of joint conservation projects* is also indicative of this partnership approach and a wider acceptance of the problems highlighted by the Inventory. However, the *lack of agreement over the responsibility to survey the Torridge area*, between the Local Authority and the conservation organisations, and concern over the *planting of trees on marginal Culm Grassland sites*, suggests that the acceptance of the problem is not universal. There is also concern about the *planting of flax on Culm sites*, although this has now been accepted as a problem by the flax producers and has led to the production of the *flax growers' protocol.*

- **Resolution Proposal**

The *adverse state of the agricultural economy* has a major impact upon Culm Grassland management, which is largely reliant on the health of beef farming. The beef farming sector is experiencing a considerable downturn with low profit margins, and coupled with the *BSE crisis*, has produced a very unhealthy future for Culm Grassland conservation. As a result, there is considerable concern about the *structural changes in farm ownership*, which may lead to either further intensification or neglect of Culm sites. Therefore, it is suggested there is a strong need to support the agricultural system upon which Culm Grassland is dependent.

- **Resolution Acceptance**

The *application of Countryside Stewardship* on Culm Grassland suggests the acceptance of the need to support the agricultural system of the Culm. The application and targeting of Countryside Stewardship is undoubtedly the most significant opportunity for the conservation of Culm Grassland, with nearly 70% of habitat area in conservation agreements. However, owing to the heightened *competition for Countryside Stewardship* it is getting increasingly difficult to enter the smaller, lower quality sites with a restoration potential. It is suggested that there may be *insufficient targeting of Countryside Stewardship* towards the smaller, more marginal sites. There may also be a *need for a lower entry level grant aid scheme* that is quick, less bureaucratic, with lower thresholds and lower payments than existing schemes, to attract more cautious farmers.

There is also a move to support the agricultural system of the Culm, by *adding value to locally distinctive Culm products*. It is suggested that these products will have a greater value within the local economy by concentrating on the production of high-quality products in a high-quality landscape. However, it would appear that the idea of marketing local products has made little impact at present, which suggests that the positive impacts of these niche markets may have been overestimated by conservation organisations.

Raising the *public profile* of Culm Grassland may enhance the marketing potential of these local products. Most organisations consider it important to raise the public appreciation and awareness of Culm Grassland, although they regard it as a fairly

difficult habitat to get people to think about, since it is not particularly visually attractive.

- **Resolution Implementation**

The *advisory field visits* play an important role in conveying management knowledge, securing conservation agreements and raising the awareness of the farming community. However, there is concern that some field advisors may *lack the necessary agricultural knowledge*, upon which this conservation advice should be based.

The important role of the field advisors is also supported by the production of a newsletter, *'Culm Connections'*, and the establishment of a number of *best practice demonstration sites* and *farm events*. However, owing to limited time and resources the focus of these activities has, once again, been on the large, high-quality sites. As a result there still appears to be *limited awareness amongst the more marginal site owners*. It has been suggested that a *'one-stop shop'* approach may improve awareness, by acting as a focal point between the various partners and the farming community.

There is also some concern over the *ability of advisors to apply Countryside Stewardship to these marginal sites*. There appears to be a degree of uncertainty regarding the areas eligible for entry, suggesting that some very important marginal areas may be left out of Countryside Stewardship agreements.

Implementing the resolution to support the agricultural system of the Culm is further complicated by the *uncertainty over certain management practices*, particularly the effects of burning and the management of restoration sites. There is also some concern that the current decline in beef farming has reduced the *availability of native hardy breeds of beef cattle*, which are viewed as very important for the effective grazing of Culm Grassland.

- **Problem Resolution**

The distinction between large, high-quality sites and smaller, lower quality sites is exemplified by data showing that 67% of the Culm Grassland 'area' has been secured in a conservation agreement as opposed to only 38% of the 'number' of Culm Grassland sites. Concern was expressed over the *limited amount of site monitoring* to assess the effectiveness of the specific conservation strategies.

Therefore, the problem facing Culm Grassland, in terms of maintaining and improving the habitat fragments, has not been fully resolved, thus suggesting the need to target conservation efforts more effectively towards these more marginal, but often strategically important, sites.

- **Resolution Proposal (2)**

The need to target conservation efforts has been recognised and accepted by a number of conservation organisations, and has resulted in the establishment of the *Torridge Headwaters Project*. The Torridge Headwaters Project is a pilot project to examine the potential for indicative planning by identifying, restoring and expanding Culm sites within a small trial area. For instance, the Project has become an additional target for Countryside Stewardship and applications falling within the project area receive higher priority.

- **Resolution Acceptance (2)**

It would appear that the Torridge Headwaters Project might have lacked the overall acceptance necessary for its successful implementation. There appears to have been a *misunderstanding of the project objectives between key partners*, which has resulted in the loss of funding for the project's third year. There is a suggestion that the Project may have produced better results if it were run by several organisations rather than by one. A wider operational involvement with other organisations may have also increased the credibility, appreciation and understanding of the project.

9.1.2 Reconstruction of Connecting and Buffering Areas

The reconstruction of connecting and buffering areas is widely regarded as the next phase in the conservation of Culm Grassland, as the majority of large, high-quality sites are now in conservation agreements. The analysis of the opportunities and barriers affecting this distinguishes between the need to prioritise areas for habitat restoration, and the need to research the restoration techniques, upon which the prioritisation is dependent.

- **Problem Recognition**

A *lack of indicative planning* to prioritise areas for habitat restoration is apparent, although the further targeting of conservation efforts provided by the Torridge Headwaters Project indicates an acceptance of the problem and a possible solution (Resolution proposal 2). However, the current *lack of established habitat restoration techniques* may be hindering the development of such a strategy, as there is a need to know how to restore Culm Grassland before restoration plans can be prepared.

There is considerable confidence that, as Culm Grassland is a fairly robust, resilient habitat, large areas of marginal Culm Grassland could be restored through sympathetic management rather than the application of expensive, sophisticated restoration techniques.

- **Problem Acceptance**

The establishment of *habitat restoration pilot projects* to explore habitat restoration techniques is indicative of the acceptance of the problem. These pilot projects are necessary to demonstrate the effectiveness of restoration techniques, which will both aid the indicative planning process and perhaps increase the confidence of the farming community, encouraging them to apply these techniques on suitable areas of land.

- **Resolution Proposal**

There appear to be considerable problems associated with the restoration of Culm Grassland on agriculturally improved land, owing to the difficulty in reducing soil fertility. One suggested solution is to remove 85% of the organic mineral layer, which would appear to be neither economically nor socially attractive. However, it has been suggested that it is far easier to restore Culm Grassland, to a certain degree, on forestry land, as this was often planted on Culm sites and the soil would appear to have changed less than under a more intensive agricultural regime.

- **Resolution Acceptance**

There is currently *no effective funding mechanism* to fund the restoration of Culm Grassland sites. Existing funding options in Countryside Stewardship would appear to be inadequate to cover the expensive restoration costs, such as the removal of nutrients.

It is suggested that *individual owner attitudes* are a very significant factor in terms of accepting restoration options, in that conservation will only work if there is sympathy for it from the landowner or farmer. Farmers can be influenced by economic factors, but one is often reliant on their attitudes. As a result there has been considerable difficulty in persuading farmers to consider habitat restoration, suggesting it is very unlikely that they will ever consider the more drastic habitat restoration techniques, such as the removal of the majority of the soil layer.

Although the restoration of Culm Grassland may appear more straightforward on forestry land, it is suggested that there may be significant agreement issues between conservation organisations and the Forestry Commission over the release *of forestry land for habitat restoration*.

9.2 EXMOOR PROBLEM PATHWAY

The Exmoor problem pathway illustrated in Figure 9.2 can be divided into two distinct sections based upon the wider countryside objectives defined in Section 7.1.2. The first is concerned with the maintenance of the existing habitat matrix and patches; the second deals with the improvement of connecting and buffering areas.

Wider Countryside Objectives / Problem Solving Sequence	Maintenance of Habitat Matrix & Patches			Improvement of Connecting & Buffering Areas	
Problem Recognition			**Further monitor conservation efforts**	**Prioritisation of areas** *Knowledge*: Lack of knowledge of marginal sites *Technology*: Lack of indicative planning	**Research restoration techniques** ***Technology*: Lack of established heathland habitat restoration techniques**
Problem Acceptance	*Agreement*: Partnership approach		***Agreement*: Lack of consensus over heathland burning practices** *Agreement*: Concern over ESA stocking levels; *Agreement*: Difference of opinion over need for woodland management *Knowledge*: Lack of information in the spread of bracken; and the encroachment of beech and rhododendron	*Technology*: Exmoor Trees & Woodland Guide *Economic*: New Native Woodlands in National Parks	
Resolution Proposal	**Support of agricultural/forestry system** ***Political*: Adverse state of agricultural economy - neglect;** intensification**; change in stocking regime** *Political*: BSE 30-month rule *Economic*: Lack of woodland markets		**Development of monitoring strategies**	**Restoration of agricultural land**	**Restoration of forestry land**
Resolution Acceptance	***Economic*: Application of ESA** *Economic*: ESA reactive rather than proactive ***Economic*: ESA payment structure** *Economic*: Lack of flexibility in ESA agreements *Economic*: Lack of grazing specification in ESA agreements	***Political*: Attachment of environmental conditions to agricultural subsidies** ***Economic*: Ownership by conservation body**	*Economic*: Working Woodland Project ***Social*: Exmoor Woodland Project Officer** *Economic*: Woodland grants	***Technology*: Development of GIS based on aerial photographs** *Knowledge*: Aerial photographs	*Economic*: ESA proactive restoration work *Social*: Owner acceptance of conservation solutions *Social*: Lack of public acceptance of conservation solutions	***Agreement*: Lack of agreement over releasing forestry land for heathland restoration** ***Political*: Conflicting policies**
Resolution Implementation	*Social*: Advisor field visits; *Social*: ENP acting as 'one-stop shop' *Social*: Negative perception of conservation organisations; *Social*: Establishment of moorland panel *Economic*: Lack of labour to control burning; *Economic*: Difficulty entering commons into ESA *Economic*: Moving stock from ESA to surrounding land; ***Economic*: Grassland entered in wrong tier of ESA** *Economic*: High cost of deer fencing; *Agreement*: Lack of agreement over need for deer fencing *Social*: Fragmented woodland ownership				
Problem Resolution	**Majority of habitat in conservation management** ***Knowledge*: Lack of monitoring** *Knowledge*: Lack of specific knowledge; *Knowledge*: Information not freely available				

Figure 9.2 - Exmoor problem pathway

9.2.1 Maintenance of Habitat Matrix and Patches

- **Problem Recognition**

The need to maintain the existing matrix and patches of Upland Heathland and Upland Oakwood on Exmoor is widely regarded as a primary conservation objective, as confirmed in Table 7.1.

- **Problem Acceptance**

The strong *partnership approach* to conservation on Exmoor is indicative of a general acceptance of the primary conservation objective, as it allows the various organisations to bring in their different skills and experience and work towards common objectives. However, it is suggested there may be difficulties associated with the particularly high level of involvement and the reliance on key individuals.

- **Resolution Proposal**

Heathland management is dependent on a viable mixed grazing regime, yet the effects owing to the *adverse state of the agricultural economy*, in terms of *neglect*, *intensification* and a *change in the stocking regimes* coupled with the *BSE cr*isis, has produced a very unhealthy future for heathland conservation. Similarly, the *lack of woodland markets* is often criticised as the main factor behind the decline in active woodland management. There is a long history of woodland management on Exmoor, and many would like to see a return to these active management practices. Therefore, it is apparent that there is a strong need to support the agricultural and forestry systems on Exmoor, upon which Upland Heathland and Upland Oakwood are dependent.

- **Resolution Acceptance**

The *application of the Environmentally Sensitive Area* (ESA) scheme on Exmoor clearly confirms the need to support the agricultural system. The introduction of the ESA is undoubtedly one of the most significant opportunities for Heathland conservation, with a high proportion of heathland now in ESA agreements. However, there is considerable criticism that the ESA is *too reactive* and simply maintains past conditions, rather than seeking proactively to maintain and restore the habitats. There is also significant concern that incentives offered under the existing *ESA payment structure*, which is based upon a profit-foregone basis, may be insufficient to encourage more positive work aimed at conserving biodiversity. Many organisations would like to

see a move away from this profit-foregone basis to a more targeted approach towards important habitats. The ESA scheme is also criticised for its *lack of flexibility*, preventing some farmers from entering the scheme, and for its *lack of grazing specification*, with no premium placed on hardier, traditional breeds.

The *attachment of environmental conditions to agricultural subsidies* has also been a key opportunity in protecting Exmoor Heathland. It is suggested that these conditions have worked particularly well on Exmoor with the ESA, where there is a 'carrot-and-stick' approach, so that the ESA allowed farmers to change relatively painlessly. The *direct ownership* and management of large areas of Heathland and Woodland by conservation bodies also secures another major conservation opportunity.

The establishment of the *Working Woodlands Project* and the *Exmoor Woodland Project Officer* is a clear indication of the need to encourage active woodland management on Exmoor, along with existing *woodland grants* aimed at establishing and managing woodlands.

- **Resolution Implementation**

Advisory field visits play an important role in conveying management knowledge, securing conservation agreements and raising the awareness of the farming community, but these important field officers have very limited time and resources and are unable to visit all interested parties. The multiple involvement in wider countryside conservation, although necessary, is often confusing for many farmers and landowners. Although, Exmoor National Park is a well-recognised first point of contact for many people, often acting as a *'one-stop shop'*, providing essential advice and information.

Despite these efforts to raise the awareness of the farming community, there is still a *strong perception that the conservation organisations are very opposed to positive management* of heathland, such as burning. In an attempt to overcome this negative perception of conservation organisations a *Moorland Panel* has been established with significant local farmers, where they can discuss moorland management issues.

There is a *lack of the necessary labour to control heathland fires*, in the way that the conservation organisations would like to see them controlled, which is also inhibiting

effective heathland management. It is also considered particularly *difficult to enter areas of common land into ESA* agreements.

As more areas of heathland go into ESA agreements there is growing concern that surrounding semi-improved habitats, outside of the ESA, will be intensified as farmers *move their stock from their ESA land to these surrounding areas*. It is also suggested that in the early stages of the ESA scheme some important *grassland sites were entered into a lower tier* than their quality merits. Although not actually heathland, these unimproved and semi-improved grasslands are now some of the most threatened habitats on Exmoor.

On the woodland side, it is suggested that the requirement to erect expensive deer fencing is discouraging the establishment and management of some woodland. There is also a *lack of agreement over whether this fencing is always necessary*. There are also woodland management issues associated with the *fragmented ownership* of Upland Oakwood, with many woods being linked with farms rather than larger estates.

- **Problem Resolution**

There is evidently considerable conservation effort directed towards the conservation of Upland Heathland and Upland Oakwood, in terms of maintaining the habitat matrix and patches, with the majority of the habitat in conservation management (see Section 7.1.1).

However, there is considerable concern about the *lack of monitoring* to assess the effectiveness of current conservation efforts on Exmoor. Adequate monitoring will provide mileposts and guide subsequent management action. This problem is further compounded by a considerable *lack of specific knowledge* of certain habitats and species on Exmoor. There was also concern expressed that certain items *of information were not freely available* to the necessary organisations.

- **Problem Acceptance (2)**

A lack of monitoring is also associated with a number of controversial issues such as *stocking levels*, *burning practices* and the *impact of active woodland management*. It is also widely accepted that further monitoring will greatly assist the building of consensus over these controversial issues.

The ESA scheme has undoubtedly had major benefits in terms of reducing grazing pressure, but there is now *concern that the stocking levels* may be too low to suppress the grass in certain areas, which may lead to the scrubbing up of some heathland sites. The *lack of consensus over heathland burning practices* further complicates the issue of implementing heathland conservation strategies, which has resulted in a lot of uncontrolled burning of heathland and has become a significant issue on Exmoor. There also appears to be a *difference of opinion regarding the need for active woodland management*, with some organisations being more interventionist than others. It is often suggested that the biological significance of certain woods has flourished because of inactivity, and that the general intensification of woodland management is a possible threat.

There is also concern that a *lack of information on the spread of bracken and the encroachment of beech and rhododendron* will lead to doubts about prioritising the most important areas and applying expensive management measures.

- **Resolution Acceptance (2)**

The need for further monitoring of conservation efforts is recognised by the current *development of a geographical information system* (GIS), which is expected to be a valuable monitoring resource that is intended fully to realise the potential of the extensive range of *aerial photographs* of Exmoor.

9.2.2 Improvement of Connecting and Buffering Areas

The improvement of connecting and buffering areas, the second landscape ecological objective, is widely regarded as the next phase in the conservation of Upland Heathland and Upland Oakwood, as the majority of large, high-quality sites are now in conservation agreements.

The analysis of the opportunities and barriers affecting the achievement of the objective to improve the connecting and buffering areas distinguishes between the need to prioritise areas for habitat restoration, and the need to research the restoration techniques, upon which the prioritisation is dependent.

- **Problem Recognition**

As the existing knowledge base on Exmoor has focussed on the identification of high-quality habitats, there is a relatively *poor knowledge of marginal habitats* with a restoration potential. A sound knowledge of these marginal habitats is necessary to take forward the conservation of Exmoor habitats. As a result there is also a possible need to have an *indicative plan* to indicate areas for future habitat restoration, to extend, link and buffer existing areas. Others though, believe that habitat restoration is much more dependent on taking opportunities as they arise, as in a farmed landscape conservationists lack control over land use.

However, the success of an indicative plan is also dependent on the establishment of successful habitat restoration techniques, which appear to be lacking, and the appropriate funding mechanisms. The current *lack of established heathland restoration techniques* is considered to be a highly significant issue. Until the restoration knowledge is available, it will not be possible to produce an indicative strategy to target conservation efforts.

- **Problem Acceptance**

The development of the *Exmoor Trees and Woodland Guide* is an example of an indicative strategy for establishing and managing woodlands. Unlike heathland there is adequate technical knowledge for creating new native woodlands, although there is a current lack of financial mechanisms to support their establishment. The *New Native Woodlands in National Parks* challenge fund, as the name suggests, was introduced to encourage the establishment of new woodlands in national parks, although a lack of funds resulted in the adoption of only one scheme in Exmoor National Park.

- **Resolution Proposal**

It is considered to be extremely difficult to restore heathland on agriculturally improved sites, as there is a significant problem associated with the removal of nutrients. However, it is suggested that it is far easier to restore heathland on forestry land, where trees have been planted on former heathland sites. There is a strong correlation between former heathland sites and present woodland plantations, and the restoration of these sites is fairly straightforward as the heathland soils would appear to have changed less than under a more intensive agricultural regime.

- **Resolution Acceptance**

There are *proactive elements to encourage heathland restoration* under tier 2 of the Environmentally Sensitive Area scheme, although there has only been a very limited take up. It is suggested that the limited financial incentives are probably insufficient to encourage positive management and are responsible for the poor take up. Others though, regarded the lack of established restoration techniques as more important than the lack of financial incentives.

It is also suggested that there is a tremendous psychological barrier to overcome in gaining the *owner acceptance of the conservation solutions* to restore heathland on agricultural land, as it directly opposes their farming ethos. There is also a certain degree of scepticism over whether it is actually possible to re-create heathland on agriculturally improved land. *The public acceptance of the more extreme conservation solutions* to restore heathland, such as soil stripping, could also be another significant barrier to heathland restoration in the future.

In terms of restoring heathland on forestry land, it has been suggested there is a huge potential for restoring heathland on forestry sites. However, there may be significant agreement issues between conservation organisations and the Forestry Commission over the *release of forestry land for heathland restoration*, as these woodlands have considerable economic value and the Forestry Commission would require compensatory planting for any woodland removed for heathland restoration.

There appears to be a slight *conflict of policies* concerning forestry and heathland conservation. On the one hand, there is a national policy to increase the area of woodland cover, so the removal of trees for heathland restoration is discouraged. On the other, there is a national BAP policy to re-create areas of heathland, and it is suggested that the removal of trees from former heathland sites is the most effective method.

9.3 BLACKMORE VALE PROBLEM PATHWAY

The Blackmore Vale problem pathway (Figure 9.3) can be divided into two distinct sections based upon the specific wider countryside objectives defined in Section 8.1.2. The first objective is concerned with the maintenance and improvement of the existing

habitat matrix, patches, connecting and buffering areas; whilst the second deals with the reconstruction of connecting and buffering areas.

Wider Countryside Objectives / Problem Solving Sequence	Maintenance & Improvement of Habitat Matrix, Patches, Connecting & Buffering Areas		Reconstruction of Connecting & Buffering Areas	
Problem Recognition			**Prioritisation of areas** *Knowledge*: Lack of knowledge of marginal sites *Technology*: Absence of indicative planning	**Research restoration techniques** *Technology*: Lack of established habitat restoration techniques
Problem Acceptance	***Agreement*: Partnership approach; *Economic*: Partnership funding of projects** *Agreement*: Poor communication between partners; ***Agreement*: Need for co-ordination of partners/projects** ***Agreement*: Communication benefits from field meetings**		***Technology*: Indicative planning pilot project - 'Unconscious project' by DWT**	***Technology*: Need for wider dissemination of habitat restoration knowledge**
Resolution Proposal	**Support of agricultural/forestry system** *Political*: Adverse state of agricultural economy - neglect; **intensification; change in stocking regime** ***Political*: BSE crisis; *Economic*: High capitalisation on modern dairy farms** ***Economic*: Lack of markets for woodland products** *Social*: Change in farm ownership - intensification as farms bought by adjacent farms; neglect as farms bought by 'incomers'		**Further target conservation efforts** *Technology*: Indicative planning pilot project - Blackmore Vale HRP	
Resolution Acceptance	**Agriculture** ***Economic*: Application of Countryside Stewardship;** *Economic*: Competition for CS; *Economic*: Insufficient targeting of CS; ***Economic*: Need for higher incentives; *Economic*: Lack of incentives for certain land types;** *Economic*: Lack of flexibility in CS; *Economic*: Lack of introductory grant aid scheme ***Political*: Attachment of environmental conditions to agricultural subsidies** *Political*: Need to move from agricultural production payments to area payments ***Political*: Introduction of Rural Development Regulation** *Economic*: Dilution of Countryside Stewardship with Rural Development Plan ***Economic*: Shift to organic farming systems;** *Economic*: Local markets *Economic*: West Dorset Food Links; *Social*: Lack of public awareness	**Forestry** ***Economic*: Application of woodland grants** ***Economic*: Application of Challenge Funding for woodland improvement** *Political*: New Forest Strategy *Political*: Woodland Assurance Scheme ***Economic*: Appointment of Woodland Officer**	***Agreement*: Co-ordination/communication benefits provided by the Blackmore Vale HRP** ***Economic*: Targeting benefits provided by the Blackmore Vale HRP**	
Resolution Implementation	***Social*: Advisor field visits; *Social*: Mistrust/suspicion of conservation organisations;** *Social*: Lack of staff continuity ***Social*: Need for 'one-stop shop' / single point of contact** ***Social*: On-farm demonstrations;** *Social*: Publications; *Social*: Formation of Dorset Woodland Forum *Knowledge*: Lack of habitat management knowledge; *Agreement*: Lack of consensus on woodland restoration techniques *Economic*: New 'incomers' paying for habitat management; *Knowledge*: Lack of knowledge about changes in farm ownership *Technology*: Shortage of skilled conservation contractors; *Technology*: Need for a directory of specialist contractors/suppliers ***Technology*: Non-availability of correct grazing livestock**		***Social*: Benefit of single point of contact in the Blackmore Vale HRP**	
Problem Resolution	*Knowledge*: Lack of monitoring; *Technology*: Development of GIS based on aerial photographs ***Knowledge*: Lack of specific habitat/species knowledge; *Knowledge*: Poor co-ordination of knowledge**			

Figure 9.3 - Blackmore Vale problem pathway

9.3.1 Maintenance and Improvement of Habitat Matrix, Patches, Connecting and Buffering Areas

- **Problem Recognition**

The need to maintain and improve the habitat matrix, patches, connecting and buffering areas is widely regarded as one of the primary conservation objectives (see Table 8.1).

- **Problem Acceptance**

Once again, the establishment of a *partnership approach*, which is widely considered as one of the most significant opportunities for conservation in Dorset, is indicative of the general acceptance of the primary conservation objective. A partnership approach allows the various organisations to pool their resources and work towards common objectives. The *partnership funding of projects* is also indicative of this partnership approach and a wider acceptance of common objectives.

Whilst there are considerable opportunities from working in partnership, it is recognised that a partnership approach places an increasing emphasis on maintaining efficient *communication* between, and *co-ordination* of, the multiple organisations involved to ensure they are pulling in the same direction. At present, neither poor communication nor poor co-ordination would appear to be significant issues between the partners, with a good system of meetings and working groups. However, it is suggested there may be considerable communication benefits from the establishment of more informal, *field-based meetings*, which may help develop important informal relationships.

- **Resolution Proposal**

The *adverse agricultural climate* has a major impact on many semi-natural habitats within the Blackmore Vale, with many of them being reliant on a viable mixed grazing regime. The resultant *neglect*, *intensification* and *changes in stocking regimes*, coupled with the *BSE crisis* and the *high capitalisation on modern dairy farms*, has produced a bleak future for many habitats. There is also concern that the structural *changes in farm ownership* may lead to further *intensification* or *neglect*, as farms are bought by adjacent farms and non-farming 'incomers', respectively. Similarly, the *lack of markets for woodland products* is often criticised as the main factor behind the neglect of many woodlands. Therefore, it is apparent that there is a strong need to support the

agricultural and forestry systems, upon which many habitats in the Blackmore Vale are dependent.

- **Resolution Acceptance**

The *application of Countryside Stewardship* in the Blackmore Vale has undoubtedly made a significant impact, in terms of securing the conservation of semi-natural habitats. It is often described as being responsible for more success than any other measure to date. However, it is believed that Countryside Stewardship has become a rather elitist scheme, owing to the *increased competition* for the limited funds, which favours high-quality sites and neglects small, marginal sites with a restoration potential. Further *targeting of Countryside Stewardship* towards the smaller, strategic sites, may help resolve the issue, although targets are already agreed with the various partners. A lack of targeting is not considered to be a significant issue under the present system, as applications for Countryside Stewardship already score more highly if they form part of a cluster of habitats rather than being in isolation. There appears to be a pressing *need for higher incentives* to encourage more proactive conservation work, indeed, many organisations are very keen to see a move away from the current profit-foregone basis to a more targeted approach towards important habitats, which provide significant biodiversity benefits. The Countryside Stewardship scheme is criticised for an apparent *lack of incentives for certain land types*, such as arable land, which is considered to a significant barrier for conservation within the area. It is also suggested that a *lack of flexibility in Countryside Stewardship* may be a barrier, although this is not regarded as significant issue in general. Others would like to see the *introduction of a lower entry level grant aid scheme*, to encourage more cautious, conservative farmers to participate in conservation schemes.

The *attachment of environmental conditions to agricultural subsidies* is also considered to be a highly significant opportunity for conserving semi-natural habitats within the wider countryside. It is also suggested that there is an imperative to *move away form production based subsidies to area-based payments*. In addition, it is hoped the *Rural Development Regulation* will bring major opportunities for conservation in the wider countryside by bringing together social, economic and environmental issues. However, there is a slight concern that the inclusion of further socio-economic issues may *dilute the amount of money for biodiversity conservation*.

The increasing *shift towards organic farming* is also regarded as a significant opportunity in supporting the agricultural systems of the area, as it is much more sympathetic to the associated habitats. There is also a move to promote the value of *local markets*, such as the *West Dorset Food Links*, as it is claimed that locally distinctive products, produced from an extensive agricultural system, will have a greater value within the local economy. Raising the *public awareness* of the area may also enhance the marketing potential of these locally produced products.

In terms of supporting forestry, it is hoped the *new Forestry S*trategy and the *Woodland Assurance Scheme* will provide positive benefits for both woodland management and the marketing of woodland products, in addition to existing *woodland grants* and *Challenge Funding* for woodland improvement. The appointment of a *County Woodland Officer* is also indicative of the need to support and promote positive woodland management.

- **Resolution Implementation**

Advisory field visits play a highly important role in conveying management knowledge, securing conservation agreements and raising the awareness of the farming community, but these important field officers have very limited time and resources. It is suggested that there is a certain degree of *mistrust and suspicion towards conservation organisations*; this situation is obviously not improved by the high degree of staff turnover and the *lack of staff continuity*, as it may hinder the development of relationships between advisors and the farming community. It is also believed that a *'one-stop shop'* or a *'single point of contact'* may improve the situation by acting as a focal point between the various partners and the farming community, who view the various organisations as rather amorphous and murky. In addition, the establishment and promotion of *on-farm demonstrations*, supporting *publications* and the *Dorset Woodland Forum* are designed to improve awareness of the wider community and provide greater credibility for conservation options.

It is hoped that new 'incomers' to the area may provide a conservation opportunity, as they may well buy the land for its conservation value and be prepared to *put their own money into habitat management*, rather than neglecting the land as suggested earlier. However, it is *difficult to trace these changes in farm ownership* to identify the new owners who may require conservation advice and guidance.

There does not appear to be a significant *lack of habitat management knowledge*, although it was suggested there might be a *lack of consensus on woodland restoration techniques*. Of greater concern is the current *shortage of skilled conservation contractors* to carry out specialist conservation work; it was suggested that it would be helpful to a have a *directory of specialist contractors/suppliers* offering the necessary skills/supplies. In addition, there is also a current *shortage of suitable grazing livestock* and, as a result, a number of conservation organisations have considered buying their own animals to manage important grassland sites.

- **Problem Resolution**

There has obviously been considerable conservation effort directed towards the conservation of semi-natural habitats in the Blackmore Vale, in terms of maintaining and improving the habitat matrix, patches, connecting and buffering areas. However, there is concern about the *lack of monitoring* to assess the effectiveness of current conservation efforts, especially Countryside Stewardship, to provide mileposts and guide future conservation efforts. The importance of monitoring is highlighted by the *development of a GIS, based upon aerial photographs*, which is intended to be a valuable monitoring resource. This problem is further compounded by a considerable *lack of specific habitat/species knowledge*, which is widely regarded as a significant barrier, although it is suggested that the problem may be associated with the *poor co-ordination of existing information*, rather than a fundamental lack of knowledge.

9.3.2 Reconstruction of Connecting and Buffering Areas

Similar to the Culm Case Study, the reconstruction of connecting and buffering areas is viewed as the next phase in the conservation in the Blackmore Vale, as the majority of large, high-quality sites are now in conservation agreements. The analysis of the opportunities and barriers affecting the achievement of the objective to reconstruct connecting and buffering areas distinguishes between the need to prioritise areas for habitat restoration, and the need to research the restoration techniques, upon which the prioritisation is dependent.

- **Problem Recognition**

The increasing interest in the restoration potential of marginal wildlife sites in the wider countryside is hindered by the current *lack of knowledge of marginal sites* which could be used potentially to extend, link and buffer existing wildlife sites. This lack of knowledge is apparently closely linked to the *absence of an indicative planning strategy*, although others believe that much can be achieved in the wider countryside without an indicative strategy, on an opportunistic basis.

There does not appear to be a significant *lack of established habitat restoration techniques* for most semi-natural habitats in the area. It is likely that there will only be a limited need for more radical restoration techniques, as there is currently enough semi-natural land in the area, with established restoration techniques.

- **Problem Acceptance**

The Dorset Wildlife Trust recognised the need to *target conservation efforts strategically* in the wider countryside; however, it was pointed out that this happened by default, rather than by a conscious approach.

In terms of habitat restoration, there is a suggestion that the current problem is associated with the *poor dissemination of existing habitat restoration knowledge*, rather than a lack of primary research.

- **Resolution Proposal**

The *Blackmore Vale Habitat Restoration Project* - widely regarded as one of the most significant conservation opportunities - is one of four groundbreaking attempts at producing an indicative plan for wider countryside conservation. In particular, the need to conduct a full phase-one survey for the project demonstrated the existing lack of knowledge and the importance of obtaining this information in order to produce an indicative plan to target future conservation/restoration efforts.

- **Resolution Acceptance**

A particular strength of the Blackmore Vale Project was the *co-ordination/communication benefits* provide by the indicative plan, as it provided a useful basis for reaching consensus and promoting wider acceptance of the resolution to further target conservation efforts in key areas. The indicative plan also allowed the

additional targeting of grant aid schemes to strategically important areas, with applications falling within the project area receiving higher priority.

- **Resolution Implementation**

In terms of implementation, it is widely acknowledged that the *single point of contact adopted* in the Blackmore Vale Project has made a significant improvement in developing working relationships with the farming community.

CHAPTER 10 REFLECTIONS AND FUTURE DEVELOPMENTS

10.0 CHAPTER OUTLINE

This final chapter begins by reflecting upon the significance of this research, both in terms of research process and resultant findings, through reviewing the approach taken and the methods used and re-illustrating the substantive findings. The implications of this research, which advocates a more holistic landscape scale approach, for future biodiversity planning, are then explored. This in turn allows various action strategies to be developed, to reinforce the opportunities and overcome the barriers to effective biodiversity planning. This chapter concludes by highlighting areas for future research and drawing general conclusions.

10.1 SIGNIFICANCE OF THIS RESEARCH

10.1.1 A Social-Scientific Approach

Planning for the conservation of biodiversity in the wider countryside would initially appear to be a purely natural science issue. However, this thesis has clearly demonstrated that effective biodiversity planning is reliant on a social-scientific exploration and understanding of the implementation process as much as it is reliant on natural science, to underpin initial biodiversity objectives. The formulation and publication of biodiversity plans can no longer be seen as the end of the planning process but, rather, simply the foundations for future biodiversity action. Decisions made during the implementation stage are as much part of the planning process as the formulation and drafting of the original plan, clearly emphasising that the process does not come to an end once the plan is finalised.

It is apparent that there are often considerable difficulties in translating the 'outputs' of these plans into effective 'outcomes' on the ground. These implementation difficulties associated with biodiversity planning are further compounded by the lack of statutory control and the reliance on non-statutory mechanisms to deliver biodiversity benefits. This study has started to uncover the numerous barriers and bridges impacting upon the implementation process and will thus provide a sound basis for unlocking the potential of these plans to deliver benefits on the ground.

10.1.2 Key Methodological Components

This research has established the usefulness and relevance of Trudgill's (1990) categorisation of barriers in providing a basis for an analytical framework in which to examine the opportunities and barriers to biodiversity planning. Although the barrier framework was originally developed by Trudgill to examine the constraints to environmental improvement at the macro-scale, it would appear that it is equally applicable to the study of micro-level problems. In acknowledgement of the relationships between the separate barrier categories, this research recognised the importance of investigating the implementation process, to identify not only the actual opportunities and barriers but also the factors underlying them. This in-depth investigation of the implementation process provides essential information to aid the development of effective action strategies.

The barrier framework also provided the foundation for the content analysis of relevant biodiversity plans, to identify potential opportunities and barriers. This exercise revealed the value of BAPs in pulling together existing biodiversity plans and projects, and listing the implementation actions necessary to achieve their objectives. In contrast, many other biodiversity planning documents gave no indication as to how their objectives were going to be met and were, therefore, unable to provide any insights into the possible opportunities and barriers. However, as the focus of BAPs is on specific habitats and species, rather than on geographical areas as a whole, it was particularly difficult to identify specific implementation actions in relation to the wider countryside objectives for each case study area. As a result, the research identified particularly representative habitats for each of the case study areas and then extracted implementation information from a range of documents at local, county and regional levels.

The identification of potential opportunities and barriers provided by the content analysis allowed the construction of a force field analysis matrix, which proved to be an especially rigorous and systematic tool with which to explore and unpack these complex issues. This framework acted as an ideal base for semi-structured interviews, as it was clearly comprehensible and accessible to non-experts, confirming earlier assumptions (International Council for Local Environmental Initiatives, 1996).

Force field analysis has previously been used to explore complex issues, though in the field of 'sustainability' it has only been used in fairly informal, pragmatic way. This innovative and meticulous application of force field analysis provided a means of seeing a complex situation as being potentially changeable, once the various forces have been identified. However, it is important to remember that opportunities and barriers are dynamic. A force field analysis only provides a snapshot at a particular time - current opportunities and barriers may be strengthened and broken down, while new opportunities and barriers emerge.

10.1.3 Generalised Opportunities and Barriers

The generalised force field analysis, presented in Table 10.1, consists of the most significant opportunities and barriers identified across the three study areas. The table was constructed from an initial identification of the significant opportunities and barriers (i.e. with a score of 3.5 or greater) *within* each case study. The mean scores of these issues were calculated *across* the case study areas, in order to highlight the most significant, generally applicable opportunities and barriers. Each of the issues identified have been extensively described and reviewed in Chapter 9.

According to the matrix (Table 10.1), the problems facing biodiversity planning will continue for as long as the opportunities and barriers remain in equilibrium. To improve the situation for biodiversity planning, there is a need to overcome this equilibrium by increasing the opportunities (driving forces) and reducing the barriers (restraining forces). Thus, the matrix will provide the necessary focus for the subsequent development of action strategies.

Table 10.1 - Generalised 'opportunities' and 'barriers' to biodiversity planning, identified across the three case study areas

OPPORTUNITIES *Positive Driving Force*	BARRIERS *Negative Restraining Force*
Agreement	
Partnership approach	Lack of agreement/consensus
Knowledge	
	Lack of knowledge of marginal habitats/species
	Lack of monitoring
Technology	
Indicative planning projects	Absence of indicative planning
	Lack of established habitat restoration techniques
Economic	
Introduction of grant schemes	Problems with grant schemes
Social	
Advisor field visits	Mutual mistrust between farmers and conservationists
Political	
Cross-compliance	Adverse state of the agricultural economy
	Unforeseen crises (e.g BSE)

10.2 IMPLICATIONS FOR BIODIVERSITY PLANNING

This thesis has clearly advocated a more holistic approach to biodiversity planning in the wider countryside. There have undoubtedly been attempts to expand conservation efforts beyond the traditional site-based systems, however these appear to have occurred in a rather fragmented and reactive manner. Indeed, this research has uncovered some inadequacies of the current development of biodiversity action planning in addressing biodiversity issues in the wider countryside, which continues to be based around a small

selection of individual habitats and species with often incompatible and occasionally conflicting objectives.

> By selecting individual habitats we inevitably get back to individual sites - many policy makers like nothing better than drawing a definitive line on a map. Many actions suggested in BAPs are based on protecting or managing individual sites. (Green, 2000, p.49)

Many conservation organisations continue to base their biodiversity conservation strategies around statutorily designated sites, rather than addressing more complex issues in the wider countryside, where they may lack control. Green (2000, p.47) does not believe "that BAPs can be anything other than a short term solution to stem declines. The BAP approach addresses symptoms rather than causes".

There is a need to re-focus conservation efforts on the *patterns* and *processes* operating in the wider countryside which drive and underpin countryside change, rather than on individual, isolated *components* of biodiversity (see Section 3.2.2). The countryside can no longer be viewed as a hierarchical assemblage of distinctly separate habitats and species, with historical conservation targets based on the perceived 'golden age' of biodiversity - that of the pre-war English countryside. Nature is a complex system of interacting processes, a vibrating web of life, in which there are no hierarchies, only networks nesting within networks (Marshall, 1998).

Future biodiversity planning must appreciate and reflect the complexity and dynamism of the countryside and its associated biodiversity. Moving the focus from the components of biodiversity to the patterns and processes will provide an opportunity for the countryside as a whole to thrive and evolve. There will be inevitable changes in biodiversity as a result - some species will become more common whilst others decline, due to both human and natural processes. However, Green (2000, p.52) explains "we should not be afraid of these ebbs and flows if we have given nature enough room". There is now clearly a need for more positive solutions to biodiversity conservation, rather than the traditional 'doom and gloom' predictions of unprecedented loss and destruction.

Landscape ecology, despite its relatively recent emergence as a scientific field of enquiry, looks set to become increasingly important in providing an insight into the

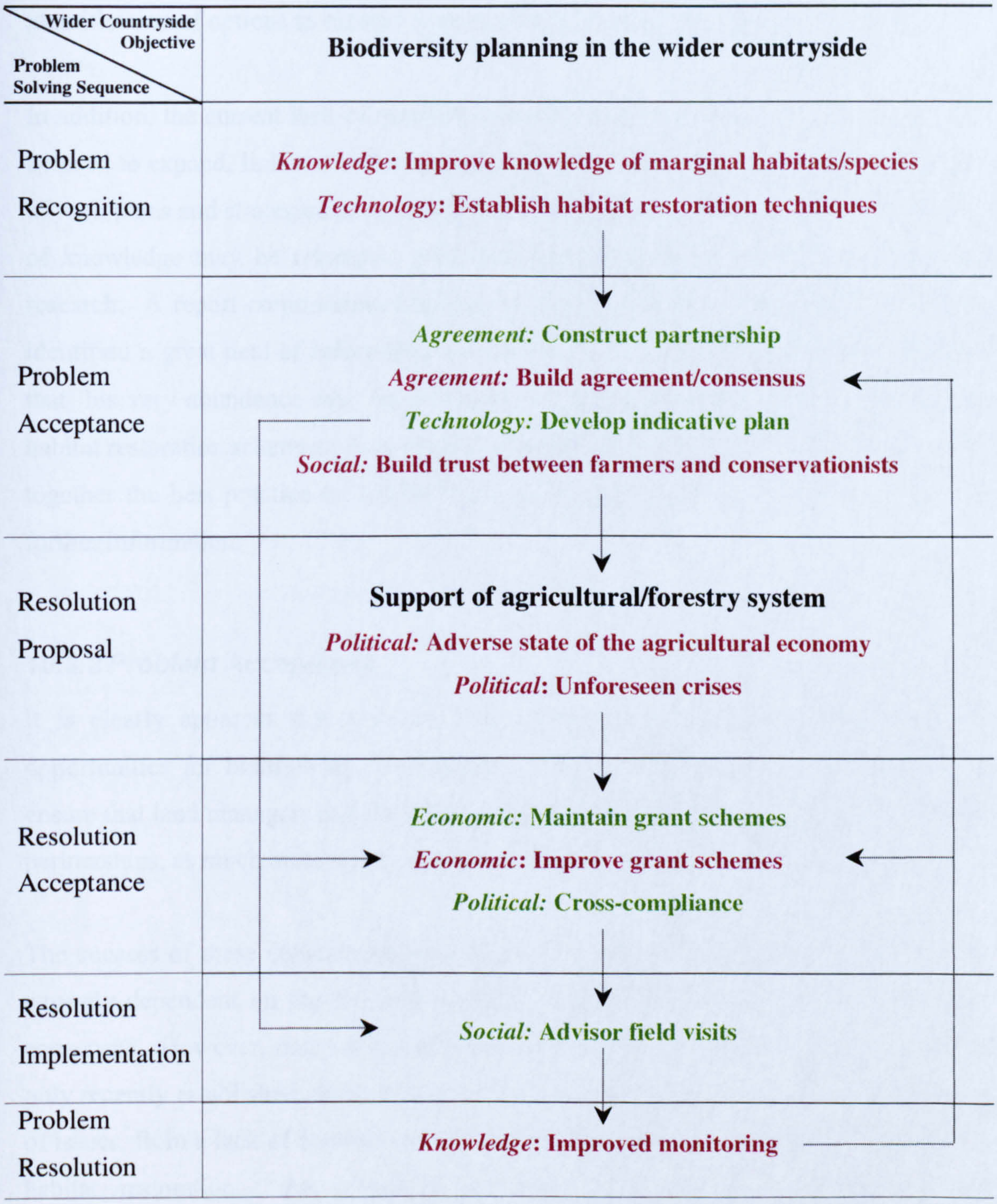


Figure 10.1 - Idealised implementation pathway

10.3.1 Problem Recognition

There is extensive knowledge of biodiversity in the English countryside; however, much of this knowledge is focussed on large, high-quality sites and a limited number of species, rather than the more *marginal habitats and species* contained within the matrix of the wider countryside. Adequate knowledge of these habitats and species is

necessary to fully recognise the problems for biodiversity conservation, and to allow the identification of options to expand conservation efforts into the wider countryside.

In addition, the current lack of *established habitat restoration techniques*, which could be used to expand, link and buffer existing habitats, may be hindering the development of such plans and strategies to expand conservation efforts. It is suggested that this lack of knowledge may be related to poor dissemination, rather than a lack of primary research. A report commissioned by the Habitat Restoration Project (Section 3.4.2.3) identified a great deal of information on habitat restoration, although it was suggested that this very abundance may be confusing for those wanting assistance in designing habitat restoration schemes. As a result, the report by Dryden (1997) attempted to draw together the best practice on habitat restoration, and to provide details on sources of further information.

10.3.2 Problem Acceptance

It is clearly apparent that a *partnership approach* is one of the most significant opportunities for biodiversity conservation in the wider countryside. It essential to ensure that land managers and the farming community form an integral element in these partnerships, as much biodiversity action will depend on their voluntary involvement.

The success of these conservation partnerships in delivering benefits on the ground is strongly dependent on the multiple partners reaching agreement and the building of consensus. However, many of the partnerships investigated for this research, although only recently established, demonstrated a *lack of agreement and consensus* over a range of issues, from a lack of consensus over management practices to the release of land for habitat restoration. An improved knowledge of marginal habitats/species and restoration techniques will remove a degree of uncertainty and provide an improved basis for establishing and maintaining effective conservation partnerships. In support, the Biodiversity Challenge report concludes that:

> Two areas fundamental to making real progress are: improving knowledge of species populations and distribution, and the extent and condition of priority habitats; and ensuring that there is widespread ownership and commitment to the agreed targets for UK priority species and habitats. (Biodiversity Challenge, 2001)

This additional knowledge will also provide the necessary foundation for the *development of indicative plans* to target future conservation efforts. Rookwood (1995) considers indicative planning to be an essential element of the biodiversity planning process. He suggests effective biodiversity plans are: proactive instead of reactive; prescriptive and not just informative; and are spatially explicit, identifying and prioritising specific areas and locations for protection and enhancement. However, a study conducted by Adams *et al.* (1994) highlighted the inability of many conservation professionals to identify specific developments, which they believed would do most for conservation. They suggest "local professionals may not have thought about the problem at a strategic level in a specific context. The implication is that the goals being sought by local conservation professionals remain ill-defined" (p.155).

Examples of indicative planning, to some extent, were evident in each of the three case study areas. The development of these plans also provides a particularly useful, clear basis for reaching consensus and promoting wider acceptance of conservation objectives, particularly with landowners and farmers. The use of indicative plans, with explicit objectives, should start to *build mutual trust between farmers and conservationists*, coupled with their combined involvement in the partnership process.

In the future, as these biodiversity partnerships mature and expand, the importance of maintaining effective communication between, and co-ordination of, the multiple organisations will become increasingly important, although these are not major issues at present.

10.3.3 Resolution Proposal

The *adverse state of the agricultural economy* and recent *unforeseen crises*, such as BSE and the recent outbreak of Foot and Mouth Disease, are having a profound impact on biodiversity conservation in the wider countryside, as much of it is reliant on extensive farming systems. The resultant changes in agricultural practices may lead to the loss of biodiversity through the subsequent intensification, neglect and changes in stocking regimes. Political barriers are often very difficult to overcome as they are often outside the control of the plan implementers because they are frequently external to the planning process (Hogwood and Gunn, 1984). However, there is obviously a

compelling need to support the agricultural and forestry systems upon which much biodiversity is dependent.

10.3.4 Resolution Acceptance

The need to support agriculture and forestry is evident with the introduction and expansion of *grant schemes*, such as Countryside Stewardship, Environmentally Sensitive Areas and Woodland Grants, which undoubtedly offer some of the most significant opportunities for biodiversity conservation in the wider countryside. However, there are inherent *problems* with many of the schemes, in particular, the heightened competition for limited resources making it increasingly difficult to enter small, but often strategically important sites. The use of indicative plans to proactively target grant schemes has already been promoted in certain case study areas.

Another key opportunity comes from *cross-compliance* - the attachment of environmental conditions to existing agricultural production subsidies. In the future, many conservation organisations hope that organic farming and local/farmers' markets will have a greater role to play in supporting the agricultural systems upon which much biodiversity is reliant, however, these are only regarded as niche markets at present.

10.3.5 Resolution Implementation

It is clearly evident that *field advisors* play an important element in the conservation of biodiversity in the wider countryside, as they convey management knowledge, secure conservation agreements and raise the awareness of the wider farming community. However, there is concern over the fragmented provision of conservation advice from multiple organisations, which is often confusing for many landowners and farmers (Wheeler, 1999; Williamson, 1999). The 'single point of contact', or 'one-stop shop', approach adopted in the Blackmore Vale case study yielded considerable communication and co-ordination benefits (Thomas, 2000). The production of an indicative plan also provides a means of proactively focussing the efforts of field advisors to strategically important areas, to make the most of their limited resources.

Another concern identified by this research was the high degree of turnover of conservation staff, which may adversely hinder the development of relationships and

the building of trust between conservationists and the farming community. Many of the key actors, particularly the 'front line' field advisors, involved in this research have now left the particular case study areas.

10.3.6 Problem Resolution

There is considerable concern over the current *lack of monitoring* to assess the effectiveness of current conservation strategies. Effective monitoring will provide mileposts to guide subsequent management actions and grant schemes prescriptions. The importance of monitoring is further reinforced by the Habitat Restoration Project (Section 3.4.2.3), which commissioned a report to develop proposals to measure the success of restoration projects (Mitchley *et al.*, 1998). It is also intimated that monitoring will assist the building of consensus over controversial issues, such as grazing levels, further reinforcing the biodiversity partnership.

10.4 FUTURE RESEARCH

A key direction for future biodiversity planning, drawn from this research, will be to encourage and promote the adoption of wider, spatially explicit plans. These plans will allow the identification and definition of the optimal pattern and configuration of habitats and management practices, for a geographically distinct area. They will ideally seek to maintain and enhance the key ecological patterns and processes for a number of highly dependent 'focal' species, through a process of detailed technical consultation, discussion, negotiation and consensus building with key actors. The ecological processes, upon which the 'focal' species are dependent, will provide full scientific justification for the specific pattern and configuration of the habitats and management practices adopted. It is also hoped that these spatially explicit plans will greatly assist the consensus building process, by clearly identifying contentious issues between key actors at an early stage. This will, in theory, provide a stable foundation for the establishment of an effective partnership, upon which these informal plans are dependent for their successful implementation.

Recent policy innovations reflect the need to re-focus conservation efforts on the wider countryside, rather than on the isolated components of biodiversity. It is recognised that a more integrated approach to biodiversity planning at the 'landscape scale' is necessary

to maximise conservation opportunities through integrating landscape, wildlife and general environmental, social and economic objectives. English Nature is just embarking upon a 'spatially explicit' landscape planning process called 'Lifescapes' - strongly influenced by landscape ecology - which is intended to provide a more integrated approach to biodiversity conservation.

The development of spatially explicit biodiversity plans will provide an unprecedented opportunity to influence the formulation and implementation of these plans, and to study biodiversity planning in 'real' landscapes, to gain further insight into the process of translating 'plans' into 'action' on the ground. The adoption of such plans will provide a platform on which to:

- Test the validity, suitability and applicability of landscape ecological principles;
- Study and understand the dynamic nature of opportunities and barriers, through a time series analysis of the implementation process;
- Apply, test, and refine as necessary, the preliminary implementation theory developed by this research to aid their effective implementation.

10.5 CONCLUSIONS

This research has provided an insight into the detailed nature of opportunities for, and barriers, to a 'better environment', specifically in the context of biodiversity planning. The constraining and driving forces behind local environmental issues, and the pathways to address them in policy and practical terms, have been explored systematically from a social science perspective.

Although this research focussed on biodiversity, it is highly probable that the methodology can be extended to a range of 'wider countryside' planning issues such as flooding, re-forestation, managed coastal retreat and landscape enhancement. These issues are eminently susceptible to spatially explicit planning approaches, for instance within landscape Character Areas, community forests or river catchments.

The 'Lifescapes' project, and other newly emerging work in this field such as the RSPB's 'Futurescapes' (2001), provide excellent opportunities for active research and monitoring. The exciting opportunities offered by these new initiatives, and the need to examine their barriers to and opportunities for implementation, provide a fitting and immensely timely conclusion to this research.

REFERENCES

Adams, W.M. (1986) *Nature's Place: Conservation Sites and Countryside Change,* Allen & Unwin, London.

Adams, W.M. (1993) Places for Nature: Protected Areas in British Nature Conservation, in *Conservation in Progress*, Goldsmith, F. B. and Warren, A. (Eds.), Wiley, Chichester, pp. 185-208.

Adams, W.M. (1996a) Creative conservation, landscape and loss, *Landscape Research,* **21,** (3), pp. 265-276.

Adams, W.M. (1996b) *Future Nature: A Vision for Conservation,* Earthscan, London.

Adams, W.M., Hodge, I.D. and Bourn, N.A.D. (1994) Nature conservation and the management of the wider countryside in eastern England, *Journal of Rural Studies,* **10,** (2), pp. 147-157.

Ajimal, K.S. (1985) Force field analysis - a framework for strategic thinking, *Long Range Planning,* **18,** (5), pp. 55-60.

Andrews, J. (1993) The reality and management of wildlife corridors, *British Wildlife,* **5,** (1), pp. 1-7.

Baldock, D., Fleming, V., Hill, D., Pape, D., Pienkowski, M., Treweek, J. and Yates, T. (1996) *Actions for Biodiversity in the UK: Approaches in UK to Implementing the Convention on Biological Diversity,* British Ecological Society, London.

Barrett, S. and Fudge, C. (1981) Examining the policy-action relationship, in *Policy and Action: Essays on the Implementation of Public Policy*, Barrett, S. and Fudge, C. (Eds.), Methuen, London, pp. 3-32.

Barton, P.M. and Buckley, G.P. (1983) The status and protection of notified sites of special scientific interest in south-east England, *Biological Conservation,* **27,** pp. 213-242.

Biodiversity Challenge (2001) *Biodiversity Counts: Delivering a Better Quality of Life*, www.biodiversity-challenge.org.uk/html/report.htm.

Bishop, K., Phillips, A. and Warren, L.M. (1995) Protected for ever? factors shaping the future of protected areas policy, *Land Use Policy*, **12**, (4), pp. 291-305.

Collinge, S.K. (1996) Ecological consequences of habitat fragmentation: implications for landscape architecture and planning, *Landscape and Urban Planning*, **36**, (1), pp. 59-77.

Cordrey, L (Ed.) (1997). *Action for Biodiversity in the South-West: A Series of Habitat and Species Plans to Guide Delivery,* Royal Society for the Protection of Birds, Sandy.

Countryside Agency (2001) *Protected Countryside: National Parks, Areas of Outstanding Natural Beauty and Heritage Coasts,* Countryside Agency, www.countryside.gov.uk/activities/landscapes.

Countryside Commission (1995) *The Countryside Character Programme,* CCP 472, Countryside Commission, Cheltenham.

Countryside Commission (1996) *The Character of England: Landscape, Wildlife and Natural Features,* CCX 41, Countryside Commission, Cheltenham.

Cox, G., Lowe, P. and Winter, M. (1990) *The Voluntary Principle in Conservation: A Study of the Farming and Wildlife Advisory Group,* Packard, Chichester.

Curry, N. and Owen, S. (1996) Changing rural policy in Britain, in *Changing Rural Policy in Britain: Planning, Administration, Agriculture and the Environment*, Curry, N. and Owen, S. (Eds.), The Countryside and Community Press, Cheltenham, pp. 1-27.

Dawson, D. (1994) *Are Habitat Corridors Conduits for Animals and Plants in a Fragmented Landscape ? A Review of the Scientific Evidence,* English Nature Research Report 94, English Nature, Peterborough.

Denscombe, M. (1998) *The Good Research Guide for Small-Scale Social Research Projects,* Open University Press, Buckingham, Philadelphia.

Department of the Environment, Transport and the Regions (1998) *Sustainability Counts,* DETR, London.

Department of the Environment, Transport and the Regions (1999) *Quality of Life Counts,* DETR, London.

Department of the Environment, Transport and the Regions (2000a) *Local Quality of Life Counts,* DETR, London.

Department of the Environment, Transport and the Regions (2000b) *Our Countryside: The Future, A fair Deal for Rural England (Cmnd 4909),* DETR, London.

Devon Biodiversity Partnership (1998) *The Nature of Devon - A Biodiversity Action Plan,* Devon County Council, Exeter.

Devon Wildlife Trust (1998) *Culm Connections - Issue 9 (Autumn 98),* Devon Wildlife Trust, Exeter.

Diamond, J.M. (1975) The island dilemma: lessons of modern biogeographic studies for the design of nature reserves, *Biological Conservation,* **7**, pp. 129-146.

Dover, J.W. and Bunce, R.G.H. (1998). *Key Concepts in Landscape Ecology,* proceedings of the 1998 IALE European Congress, held at Myerscough College, Preston, 3rd-5th September 1998, IALE (UK).

Dramstad, W.E., Olson, J.D. and Forman, R.T.T. (1996) *Landscape Ecology Principles in Landscape Architecture and Land-Use Planning,* Island Press, Washington DC.

Dryden, R. (1997) *Habitat Restoration Project: Fact Sheets and Bibliographies,* English Nature Research Report 260, English Nature, Peterborough.

English Nature (1993) *Natural Areas - Setting Nature Conservation Objectives, a Consultation Paper,* English Nature, Peterborough.

English Nature (1996) *Habitat Restoration Project (leaflet),* English Nature, Peterborough.

English Nature (1998) *Natural Areas - CD Rom,* English Nature, Peterborough, England.

English Nature (1999) *Annual Report 1998/99,* English Nature, Peterborough.

English Nature (2000a) *Annual Report 1999/2000,* English Nature, Peterborough.

English Nature (2000b) *Exmoor and Quantocks Natural Area Profile - Upland Heathland,* English Nature, www.english-nature.org.uk/templates/naturalareas.

English Nature (2000c) *SSSI Statistics and Damage,* English Nature, www.english-nature.org.uk/pdf/Sssis.pdf.

Environment Agency (1998a) *Local Environment Agency Plan - Dorset Stour - Action Plan,* Environment Agency, Blandford Forum, Dorset.

Environment Agency (1998b) *Local Environment Agency Plan - River Torridge & Hartland Streams - Consultation Draft,* Environment Agency, Exeter.

Eppey, K., Horton, P. and Hall, J. (1998) *Opportunities for Enriching the Vale: A Vision for Habitat Restoration in the Blackmore Vale,* English Nature Research Report 371, English Nature, Peterborough.

ETRAC (1998) *The Protection of Field Boundaries,* Environment, Transport and Regional Affairs Committee: Environment Sub-committee. House of Commons, session 1997-1998, 13th Report, HMSO, London.

Exmoor National Park (1999a) *Habitat Action Plan: Upland Heathland (1st Draft),* Exmoor National Park, Dulverton, Somerset.

Exmoor National Park (1999b) *Habitat Action Plan: Upland Oakwood (1st Draft),* Exmoor National Park, Dulverton, Somerset.

Farina, A. (1998) *Principles and Methods in Landscape Ecology,* Chapman and Hall, London.

Firbank, L.G., Smart, S.M., van de Poll, H.M., Bunce, R.G.H., Hill, M.O., Howard, D.C., Watkins, J.W. and Stark, G.J. (2000) *Causes of Change in British Vegetation,* Institute of Terrestrial Ecology, Merlewood.

Forestry Commission (1998) *A New Focus for England's Woodlands,* Forestry Commission, Edingburgh.

Forman, R.T.T. (1995) Some general principles of landscape and regional ecology, *Landscape Ecology,* **10,** (3), pp. 133-142.

Forman, R.T.T. and Godron, M. (1986) *Landscape Ecology,* Wiley and Sons, New York.

Gilbert, F.S. (1980) The equilibrium theory of island biogeography: fact or fiction?, *Journal of Biogeography,* **7,** pp. 209-235.

Gilg, A. (1996) *Countryside Planning: The First Half Century - Second Edition,* Routledge, London.

Greed, C. (Ed.) (1995). *Implementing Town Planning : Role of Town Planning in the Development Process,* Longman, London.

Green, M. (2000) Human nature, *Ecos - a review of conservation,* **21,** (2), pp. 47-52.

Grubb, M., Koch, M., Munson, A., Sullivan, F. and Thomson, K. (1993) *The Earth Summit Agreements: A Guide and Assessment,* Earthscan, London.

Haines-Young, R.H., Barr, C.J., Black, H.I.J., Briggs, D.J., Bunce, R.G.H., Clarke, R.T., Cooper, A., Dawson, F.H., Firbank, L.G., Fuller, R.M., Furse, M.T., Gillespie, M.K., Hill, R., Hornung, M., Howard, D.C., McCann, T., Morecroft, M.D., Petit, S., Sier, A.R.J., Smart, S.M., Smith, G.M., Stott, A.P., Stuart, R.C. and Watkins, J.W. (2000) *Accounting for nature - assessing habitats in the UK countryside,* DETR, London.

Handley, J., Wood, R. and Kidd, S. (1998) Defining coherence for landscape planning and management: a regional landscape strategy for north west England, *Landscape Research,* **23,** (2), pp. 133-158.

Hanski, I. and Gilpin, M. (1991) Metapopulation dynamics: brief history and conceptual domain, *Biological Journal of the Linnean Society,* **42,** pp. 3-16.

Hargrove, E.C. (1975) *The Missing Link,* Urban Institute, Washington, D.C.

Healey, P. (1992) An institutional model of the development process, *Journal of Property Research,* **9,** pp. 33-44.

Heath, M.J. (1998) *Wessex Vales Natural Area Profile,* English Nature, Wareham, Dorset.

Hobbs, R.J. (1992) The role of corridors in conservation: solution or bandwagon?, *Trends in Ecology and Evolution,* **7,** (11), pp. 389-392.

Hobbs, R.J. (1997) Future landscapes and the future of landscape ecology, *Landscape and Urban Planning,* **37,** pp. 1-9.

Hobbs, R.J. and Wilson, A.M. (1998) Corridors: theory, practice and the achievement of conservation objectives, in *Key Concepts in Landscape Ecology - Proceedings*

of the 1998 IALE European Congress, held at Myerscough College, Preston, 3rd-5th September 1998, Dover, J. W. and Bunce, R. G. H. (Eds.), IALE(UK), pp. 265-279.

Hogwood, B. and Gunn, L.A. (1984) *Policy Analysis for the Real World,* Oxford University Press, Oxford.

Hughes, M.R. and Tonkin, B. (1997) *The Culm Natural Area - A Nature Conservation Profile,* English Nature, Truro, Cornwall.

Huxley, Sir J.(Chairman) (1947) *Report of the Committee on the Conservation of Nature in England and Wales (Cmnd 7122),* HMSO, London.

Institute for European Environmental Policy (1991) *Towards a European Ecological Network,* IEEP, Arnhem, the Netherlands.

International Council for Local Environmental Initiatives (1996) *The Local Agenda 21 Planning Guide: An Introduction to Sustainable Development Planning,* ICLEI, Toronto, Canada.

International Union for the Conservation of Nature (1994) *Guidelines for Protected Area Management Categories,* World Conservation Union, Cambridge.

Jefferson, J. (1996) *Lowland Grassland: A Strategic Review and Action Plan,* English Nature Research Report 163, English Nature, Peterborough.

Jenkins, W.I. (1978) *Policy Analysis: A Political and Organisational Perspective,* Martin Robertson, London.

Kirby, K. (1998) *Personal Communication,* English Nature, Peterborough.

Kirby, K.J. (1995) *Rebuilding the English Countryside: Habitat Fragmentation and Wildlife Corridors as Issues in Practical Conservation,* English Nature Science Report 10, English Nature, Peterborough.

Kotter, J.P. and Schlesinger, L.A. (1979) Choosing strategies for change, *Harvard Business Review,* **March/April**, pp. 106-114.

Krippendorf, K. (1980) *Content Analysis: An Introduction to its Methodology,* Sage, London.

Levins, R. (1970) Extinction, in *Some Mathematical Questions in Biology - Lectures in Mathematics in the Life Sciences*, Gertenshaubert, M. (Ed.), American Mathematical Society, Providence, Rhode Island, pp. 77-107.

Lewin, K. (1951) *Field Theory in Social Science,* Harper & Row, New York.

MacArthur, R.H. and Wilson, E.O. (1967) *The Theory of Island Biogeography,* Princeton University Press, Princeton.

MacEwen, A. and MacEwen, M. (1982) *National Parks: Conservation or Cosmetics?,* Allen and Unwin, London.

Margules, C., Higgs, A.J. and Rafe, R.W. (1982) Modern biogeographic theory: are there lessons for nature reserve design?, *Biological Conservation,* **24**, pp. 115-128.

Marshall, P. (1998) *Riding the Wind,* Cassell, London.

Mason, J. (1996) *Qualitative Research,* Sage, London.

McCollin, D (Ed.) (2000). *UK IALE News - Autumn 2000,* International Association for Landscape Ecology (UK), Northampton.

McIntyre, S. and Hobbs, R.J. (1998) Human impacts on landscapes: matrix condition and management priorities, in *Nature Conservation 5: Nature Conservation in Production Environments*, Craig, J., Saunders, D. A. and Mitchell, N. (Eds.), Surrey Beatty and Sons, Chipping Norton, NSW.

Miles, M.B. (1979) Qualitative data as an attractive nuisance: The problem of analysis, *Administrative Science Quarterly,* **25,** pp. 590-601.

Miles, M.B. and Huberman, A.M. (1984) *Qualitative Data Analysis: A Sourcebook of New Methods,* Sage Publications, Newbury Park, California.

Ministry of Agriculture, Fisheries and Food (1995) *The Exmoor Environmentally Sensitive Area - Guidelines for Farmers,* MAFF.

Ministry of Agriculture, Fisheries and Food (2000a) *Conservation Grants for Farmers,* MAFF, www.maff.gov.uk/erdp/guidance/old/oldindex.htm.

Ministry of Agriculture, Fisheries and Food (2000b) *England Rural Development Programme,* MAFF, www.maff.gov.uk/erdp/docs/erdpdocsindex.htm.

Mitchley, J., Burch, F. and Lawson, C. (1998) *Habitat Restoration Project - Development of Monitoring Guidelines,* English Nature Research Report 284, English Nature, Peterborough.

Nature Conservancy Council (1975) *Nature Conservation and Agriculture,* Nature Conservancy Council, London.

Nature Conservancy Council (1984) *Nature Conservation in Great Britain,* Nature Conservancy Council, Peterborough.

Parsons, D.W. (1995) *Public Policy: Introduction to the Theory and Practice of Policy Analysis,* Edward Elgar Publishing, Aldershot.

Patton, M.Q. (1990) *Qualitative Evaluation and Research Methods - Second Edition,* Sage Publications, Newbury Park, California.

Patton, M.Q. (1997) *Utilization-Focused Evaluation - Third Edition,* Sage Publications, Thousand Oaks, California.

Peck, S. (1998) *Planning for Biodiversity: Issues and Examples,* Island Press, Washington.

Porter, K. (1999) *Personal Communication,* English Nature, Peterborough.

Porter, K. (2000) *Personal Communication,* English Nature, Peterborough.

Porter, K. (2001) *Personal Communication,* English Nature, Peterborough.

Powney, J. and Watts, M. (1987) *Interviewing in Educational Research,* Routledge, London.

Pressman, J. and Wildavsky, A. (1973) *Implementation,* University of California Press, Berkeley.

Primack, R.B. (1993) *Essentials of Conservation Biology,* Sinauer Associates, Sunderland, Massachusetts.

Qualitative Solutions and Research (1997) *QSR NUD.IST 4 User Guide,* Sage, London.

Rafe, R.W. (1983) *Species-Area Relationships in Conservation,* PhD Thesis, University of York.

Ratcliffe, D.A. (1977) *A Nature Conservation Review,* Cambridge University Press, Cambridge.

Reed, T.M. (1983) The role of species-area relationships in reserve choice: a British example, *Biological Conservation,* **25**, pp. 263-271.

Robson, C. (1993) *Real World Research,* Blackwell, Oxford.

Rookwood, P. (1995) Landscape planning for biodiversity, *Landscape and Urban Planning,* **31**, pp. 379-385.

Rowell, T.A. (1991) *SSSIs: A Health Check,* Wildlife Link.

Royal Society for the Protection of Birds (2001) *Futurescapes: Large Scale Habitat Restoration for Wildlife and People,* RSPB, Sandy, UK.

Selman, P. (1993) Landscape ecology and countryside planning: vision, theory and practice, *Journal of Rural Studies,* **9,** (1), pp. 1-21.

Selman, P. (1996) The contribution of landscape ecology, in *Landscape Study and Management*, Aalen, F. H. A. (Ed.), Boole Press, Dublin, pp. 38-54.

Selman, P. (2000) *Environmental Planning - Second Edition,* Sage Publications, London.

Selman, P. and Doar, N. (1991) A landscape ecological approach to countryside planning, *Planning Outlook,* **34,** (2), pp. 83-88.

Selman, P. and Doar, N. (1992) An investigation of the potential for landscape ecology to act as a basis for rural land use plans, *Journal of Environmental Management,* **35**, pp. 281-299.

Sheail, J. (1995) Nature protection, ecologists and the farming context: a UK historical perspective, *Journal of Rural Studies,* **11**, pp. 79-88.

Simberloff, D. and Cox, J. (1987) Consequences and costs of conservation corridors, *Conservation Biology,* **1,** (1), pp. 63-71.

Simberloff, D., Farr, J.A., Cox, J. and Mehlman, D.W. (1992) Movement corridors: conservation bargins or poor investments?, *Conservation Biology,* **6,** (4), pp. 493-504.

Spellerberg, I.F. and Gaywood, M.J. (1994) *Linear Features: Linear Habitats and Wildlife Corridors,* English Nature Research Report 60, English Nature, Peterborough.

Spellerberg, I.F. and Hardes, S.R. (1992) *Biological Conservation,* Cambridge University Press, Cambridge.

Stansfield, K. (1990) Going for green, *Public Service and Local Government,* **20,** (3), pp. 32.

Tesch, R. (1990) *Qualitative Research: Analysis Types and Software Tools,* Falmer Press, London.

Thomas, J. (1985) Force field analysis - a new way to evaluate your strategy, *Long Range Planning,* **18,** (6), pp. 54-59.

Thomas, R. (2000) *English Nature Habitat Restoration Project - Final Report,* English Nature Research Report 377, English Nature, Peterborough.

Trudgill, S.T. (1990) *Barriers to a Better Environment: What Stops us Solving Environmental Problems?,* Belhaven, London.

UK Government (1994a) *Biodiversity: The UK Action Plan (Cmnd 2428),* HMSO, London.

UK Government (1994b) *Climate Change: The UK Programme (Cmnd 2427),* HMSO, London.

UK Government (1994c) *Sustainable Development: The UK Strategy (Cmnd 2426),* HMSO, London.

UK Government (1994d) *Sustainable Forestry: The UK Programme (Cmnd 2429),* HMSO, London.

UK Government (1996) *Government Response to the UK Steering Group Report on Biodiversity,* HMSO, London.

UK Local Issues Advisory Group (1997a) *Developing Partnerships,* Guidance for Local Biodiversity Action Plans Guidance Note 2, Local Government Management Board, London.

UK Local Issues Advisory Group (1997b) *An Introduction,* Guidance for Local Biodiversity Action Plans Guidance Note 1, Local Government Management Board, London.

Ulf-Hansen, P.F. and Boyce, D.C. (1998) *Exmoor and The Quantocks Natural Area Profile,* English Nature, Taunton, Somerset.

United Nations Conference on Environment and Development (1992) *Agenda 21 - Action Plan for the Next Century,* UNCED, Rio de Janiero.

Urban, D.L., O'Neill, R.V. and Shugart, Jr.H.H. (1987) A hierarchical perspective can help scientists understand spatial patterns, *BioScience,* **37,** (2), pp. 119-127.

Vigar, G. (2000) Local 'barriers' to environmentally sustainable transport planning, *Local Environment,* **5,** (1), pp. 19-32.

Warnock, S. and Brown, N. (1998) A vision for the countryside, *Landscape Design,* **April,** (269), pp. 22-26.

Watts, K. (1996) *The Ecological Evaluation of Wildlife Habitats: an Objective Approach using the Relationship between Species Richness and Habitat Area in Somerset Woodlands,* BSc (Hons) Dissertation, University of The West of England, Bristol.

Weale, A. (1992) *The New Politics of Pollution,* Manchester University Press, Manchester.

Weisbord, M.R. (1987) *Productive Workplaces: Organizing and Managing for Dignity, Meaning and Community,* Jossey-Bass Inc., San Francisco.

Wheeler, N. (1999) *The Habitat Restoration Project - Ouse Valley Link Project,* English Nature Research Report 326, English Nature, Peterborough.

Wiens, J.A. (1997) Metapopulation Dynamics and Landscape Ecology, in *Metapopulation Biology: Ecology, Gentics and Evolution*, Hanski, I. A. and Gilpin, M. E. (Eds.), Academic Press, New York, pp. 43-62.

Williamson, B. (1999) *The Renewing the Alde,* English Nature Research Report 327, English Nature, Peterborough.

Wilson, E.O. (1994) *The Diversity of Life,* Penguin Books, London.

Wilson, E.O. (1997) Introduction, in *Biodiversity II: Understanding and Protecting our Biological Resources*, Reaka-Kudla, M. L., Wilson, D. E. and Wilson, E. O. (Eds.), National Academy Press, Washington.

Wilson, G.A., Petersen, J-E. and Höll, A (1999) EU member state responses to Agri-Environmental Regulation 2078/92/EEC - towards a conceptual framework?, *Geoforum,* **30**, pp. 185-202.

Winter, M. (1996a) Landwise or land foolish ? free conservation advice for farmers in the wider English countryside, *Landscape Research,* **21,** (3), pp. 243-263.

Winter, M. (1996b) *Rural Politics: Policies for Agriculture, Forestry, and the Environment,* Routledge, London.

Winter, S. (1990) Integrating Implementation Research, in *Implementation and the Policy Process: Opening Up the Black Box*, Palumbo, D. J. and Calista, D. J. (Eds.), Greenwood Press, Westport.

World Wide Fund for Nature (1997) *A Muzzled Watchdog ? Is English Nature Protecting Wildlife ?*, World Wide Fund for Nature - UK, Godalming, Surrey.

Yin, R.K. (1994) *Case Study Research - Design and Methods,* Sage Publications, Thousand Oaks, Calif.

APPENDICES

APPENDIX 1 - NUD.IST index categories and coding tree for the Culm Case Study

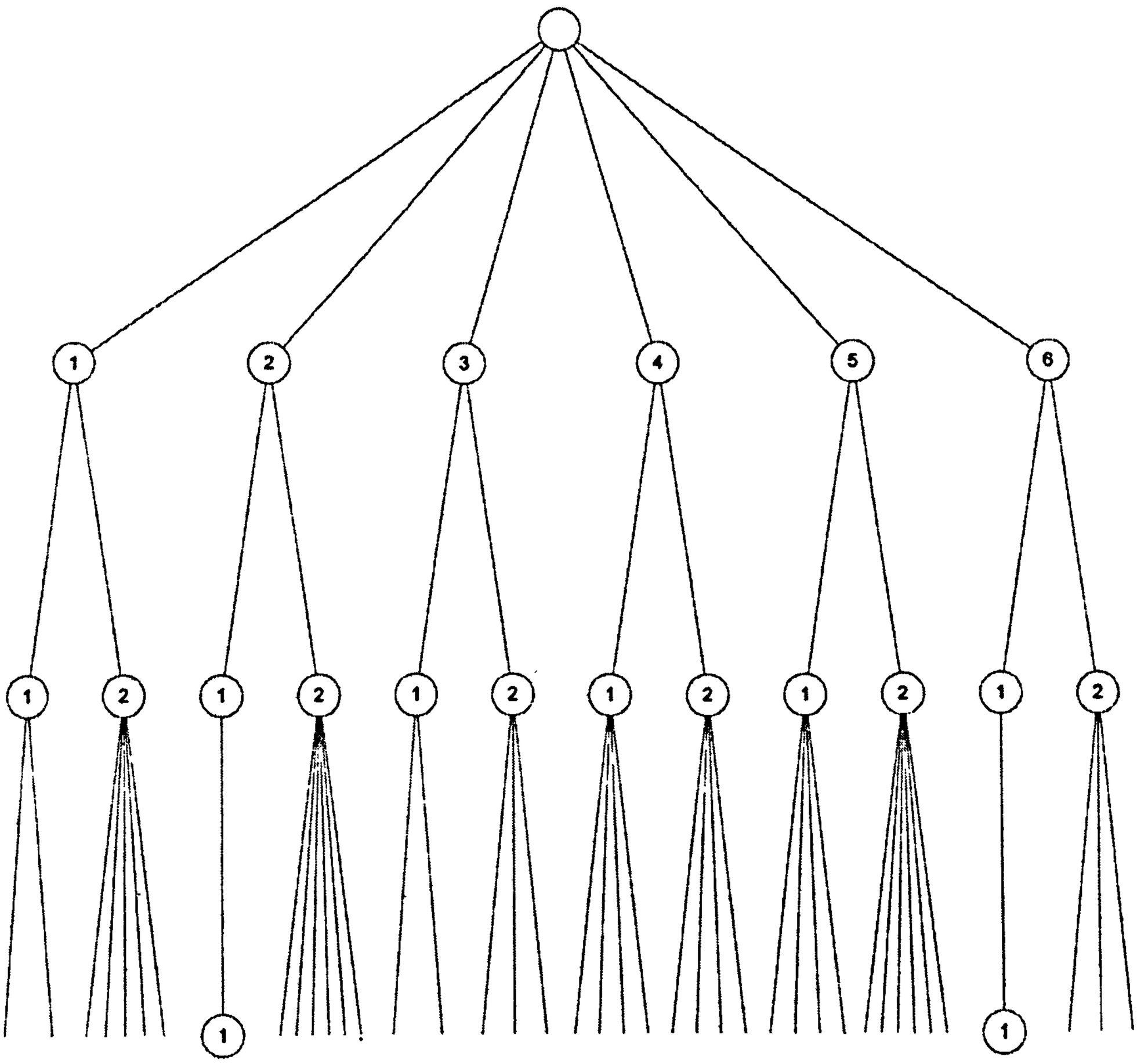
NUD.IST Index Categories

Q.S.R. NUD.IST Power version, revision 4.0. Licensee: CCRU.
PROJECT: Culm Case Study, User Kevin Watts, 11:58 am, 7 Aug, 2000.

(1) /Agreement
(1 1) /Agreement/Opportunity
(1 1 1) /Agreement/Opportunity/Culm partnership approach
(1 1 2) /Agreement/Opportunity/Habitat restoration on forestry sites
(1 2) /Agreement/Barrier
(1 2 1) /Agreement/Barrier/Poor communication between partners
(1 2 2) /Agreement/Barrier/Poor co-ordination of partners
(1 2 3) /Agreement/Barrier/Forestry planting on Culm sites
(1 2 4) /Agreement/Barrier/Uncertainty over THP objectives
(1 2 5) /Agreement/Barrier/Lack of agreement over responsibility to survey Torridge area
(2) /Knowledge
(2 1) /Knowledge/Opportunity
(2 1 1) /Knowledge/Opportunity/Culm Grassland inventory
(2 2) /Knowledge/Barrier
(2 2 1) /Knowledge/Barrier/Lack of knowledge of marginal sites
(2 2 2) /Knowledge/Barrier/Limited advisor ability to identify marginal sites
(2 2 3) /Knowledge/Barrier/Limited advisor ability to apply CS to marginal sites
(2 2 4) /Knowledge/Barrier/Limited advisor knowledge of farming systems
(2 2 5) /Knowledge/Barrier/Limited site monitoring
(2 2 6) /Knowledge/Barrier/Incomplete habitat management knowledge
(3) /Technology
(3 1) /Technology/Opportunity
(3 1 1) /Technology/Opportunity/Indicative planning pilot project - THP
(3 1 2) /Technology/Opportunity/Habitat restoration pilot projects
(3 2) /Technology/Barrier
(3 2 1) /Technology/Barrier/Absence of indicative planning
(3 2 2) /Technology/Barrier/Lack of established habitat restoration techniques
(3 2 3) /Technology/Barrier/Non-availability of correct grazing livestock
(4) /Economic
(4 1) /Economic/Opportunity
(4 1 1) /Economic/Opportunity/Application of Countryside Stewardship
(4 1 2) /Economic/Opportunity/Purchase of Culm sites by DWT
(4 1 3) /Economic/Opportunity/Adding value to Culm products
(4 1 4) /Economic/Opportunity/Funding of joint projects
(4 2) /Economic/Barrier
(4 2 1) /Economic/Barrier/Competition for Countryside Stewardship
(4 2 2) /Economic/Barrier/Insufficient targeting of Countryside Stewardship
(4 2 3) /Economic/Barrier/Lack of introductory grant aid scheme
(4 2 4) /Economic/Barrier/Lack of funding mechanism for restoration work
(5) /Social
(5 1) /Social/Opportunity
(5 1 1) /Social/Opportunity/Advisor field visits

(5 1 2) /Social/Opportunity/Publications - Culm Connections
(5 1 3) /Social/Opportunity/Best practice demonstration sites
(5 1 4) /Social/Opportunity/Farm events
(5 2) /Social/Barrier
(5 2 1) /Social/Barrier/Absence of a 'one-stop shop'
(5 2 2) /Social/Barrier/Limited awareness of marginal site owners
(5 2 3) /Social/Barrier/Negative owner attitude
(5 2 4) /Social/Barrier/Antipathy towards farm advisors
(5 2 5) /Social/Barrier/Change in ownership
(5 2 6) /Social/Barrier/Limited public appreciation and awareness
(6) /Political
(6 1) /Political/Opportunity
(6 1 1) /Political/Opportunity/Flax growers' protocol
(6 2) /Political/Barrier
(6 2 1) /Political/Barrier/Adverse state of agricultural economy
(6 2 2) /Political/Barrier/Flax growing on Culm sites
(6 2 3) /Political/Barrier/BSE 30-month rule

NUD.IST Coding Tree



APPENDIX 2 - Force field analysis summary for the Culm Case Study

Interviewee	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Min	Max	Mean
Agreement																	
Culm partnership process	5	5	5	5		5		4	4	5	4	5		3	3.0	5.0	4.5
Habitat restoration of forestry sites	dk	3	2	4		3		3	4	4	dk	3		2	2.0	4.0	3.1
Poor communication between partners	1	2	1	2		3		3	2	4	2	2		1	1.0	4.0	2.1
Poor co-ordination of partners	1	2	1	2		4		4	3	5	1	3		2	1.0	5.0	2.5
Forestry planting on culm sites	dk	3	1	3		2		5	2	5	2	2		3	1.0	5.0	2.8
Uncertainty over of THP objectives	5	1	2	dk		1		3	3	4	3	2		dk	1.0	5.0	2.7
Lack of agreement over Torridge survey	5	4	2	3		4		4	4	4	4	2		dk	2.0	5.0	3.6
Knowledge																	
Culm Grassland inventory	3	4	5	4		5		4	5	5	5	4		4	3.0	5.0	4.4
Lack of knowledge of marginal sites	5	1	2	3		4		5	3	5	3	3		4	1.0	5.0	3.5
Limited advisor ability to identify marginal sites	dk	1	2	1		4		5	2	4	3	2		4	1.0	5.0	2.8
Limited advisor ability to apply CS to marginal sites	dk	3	2	2		3		4	3	3	4	3		4	2.0	4.0	3.1
Limited advisor knowledge of farming systems	dk	2	2	1		3		3	3	4	3	3		3	1.0	4.0	2.7
Limited site monitoring	dk	4	2	4		4		4	3	4	4	2		2	2.0	4.0	3.3
Incomplete habitat management knowledge	dk	2	2	3		2		3	3	4	4	3		1	1.0	4.0	2.8
Technology																	
Indicative planning pilot project - THP	1	2	3	3		3		4	4	3	3	3		dk	1.0	4.0	2.9
Habitat restoration pilot projects	5	3	4	3		3		4	4	4	5	2		dk	2.0	5.0	3.7
Absence of indicative planning	5	2	3	3		4		5	4	3	4	2		dk	2.0	5.0	3.5
Lack of established habitat restoration techniques	dk	4	2	3		3		4	4	4	3	3		1	1.0	4.0	3.1
Non-availability of correct grazing livestock	dk	5	3	3		3		5	3	3	2	3		3	2.0	5.0	3.3
Economic																	
Application of Countryside Stewardship	5	5	5	5		5		5	5	5	4	5		5	4.0	5.0	4.9
Purchase of Culm sites by DWT	2	3	2	5		3		3	3	3	3	3		5	2.0	5.0	3.2
Adding value to Culm products	3	3	5	3		5		2	3	3	4	2		2	2.0	5.0	3.2
Funding of joint projects	4	2	3	3		5		2	4	4	3	3		3	2.0	5.0	3.3
Competition for Countryside Stewardship	dk	5	5	4		3		4	3	5	4	3		4	3.0	5.0	4.0
Insufficient targeting of Countryside Stewardship	dk	1	2	2		2		3	2	3	3	2		2	1.0	3.0	2.2

Lack of introductory grant aid scheme	dk	4	3	4		3		3	1	3	3	1		4	**1.0**	**4.0**	**2.9**
Lack of funding mechanism for restoration work	dk	1	4	4		4		3	3	4	5	3		4	**1.0**	**5.0**	**3.6**
Social																	
Advisor field visits	5	2	4	4		5		4	4	4	4	3		5	**2.0**	**5.0**	**4.0**
Publications - Culm Connections	4	5	3	4		5		4	4	3	4	3		4	**3.0**	**5.0**	**3.9**
Best practice demonstration sites	3	4	2	3		5		4	4	4	5	3		3	**2.0**	**5.0**	**3.6**
Farm events	2	4	2	3		4		4	4	3	5	2		3	**2.0**	**5.0**	**3.3**
Absence of a 'one-stop shop'	0	1	2	2		4		4	2	3	5	3		3	**0.0**	**5.0**	**2.6**
Limited awareness of marginal site owners	dk	4	3	2		4		5	4	3	4	2		3	**2.0**	**5.0**	**3.4**
Negative owner attitude	dk	3	4	3		3		3	3	5	3	2		2	**2.0**	**5.0**	**3.1**
Antipathy towards farm advisors	dk	1	1	1		3		3	2	3	2	2		1	**1.0**	**3.0**	**1.9**
Change in ownership	5	3	-3	4		4		4	4	4	3	3		1	**-3.0**	**5.0**	**2.9**
Limited public appreciation and awareness	4	5	2	4		5		4	2	2	3	1		2	**1.0**	**5.0**	**3.1**
Political																	
Flax growers' protocol	3	5	1	3		4		5	4	5	3	3		2	**1.0**	**5.0**	**3.5**
Adverse state of agricultural economy	5	dk	-3	4		5		4	4	4	5	4		4	**-3.0**	**5.0**	**3.6**
Flax growing on Culm sites	3	5	1	3		2		4	2	5	0	2		1	**0.0**	**5.0**	**2.5**
BSE 30-month rule	4	1	3	4		4		5	2	5	2	3		4	**1.0**	**5.0**	**3.4**

APPENDIX 3 - Force field analysis summary for the Exmoor Case study

Interviewee	1	2	3	4	5	6	7	8	Min	Max	Mean
Agreement											
Partnership approach	4	0	4	5	2			4	**0.0**	**5.0**	**3.2**
Heathland - Concern over ESA stocking levels	2	1	4	2	2			5	**1.0**	**5.0**	**2.7**
Heathland - Lack of consensus over heathland burning practices	4	2	3	5	3			5	**2.0**	**5.0**	**3.7**
Heathland - Lack of agreement over releasing forestry land for heathland restoration	4	4	4	4	4			2	**2.0**	**4.0**	**3.7**
Heathland - Agreement over who should run the ESA scheme	2	1	1	1	1			3	**1.0**	**3.0**	**1.5**
Woodland - Difference of opinion over need for woodland management	2	2	3	3	4			4	**2.0**	**4.0**	**3.0**
Woodland - Lack of agreement over the need for deer fencing	3	1	3	2	3			4	**1.0**	**4.0**	**2.7**
Knowledge											
Aerial photographs	4	1	2	4	4			2	**1.0**	**4.0**	**2.8**
Lack of knowledge of marginal habitats	3	3	3	3	3			4	**3.0**	**4.0**	**3.2**
Lack of specific knowledge	5	3	2	2	3			4	**2.0**	**5.0**	**3.2**
Information not freely available	3	1	3	5	3			2	**1.0**	**5.0**	**2.8**
Lack of monitoring	5	2	3	5	4			2	**2.0**	**5.0**	**3.5**
Heathland - Lack of information on the spread of bracken	3	4	3	2	2			3	**2.0**	**4.0**	**2.8**
Woodland - Lack of information on the encroachment of beech and rhododendron	3	2	2	3	2			3	**2.0**	**3.0**	**2.5**
Technology											
Development of GIS based on aerial photographs	4	2	3	4	4			5	**2.0**	**5.0**	**3.7**
Woodland - Exmoor Trees & Woodland Guide	4	2	2	3	3			3	**2.0**	**4.0**	**2.8**
Heathland - lack of indicative planning	2	2	3	2	3			5	**2.0**	**5.0**	**2.8**
Heathland - Lack of established habitat restoration techniques	5	3	3	4	4			5	**3.0**	**5.0**	**4.0**
Economic											
Ownership by conservation body	4	4	4	2	4			4	**2.0**	**4.0**	**3.7**
Heathland - Application of ESA	4	4	4	4	3			5	**3.0**	**5.0**	**4.0**
Heathland - ESA proactive restoration work	3	2	3	3	1			2	**1.0**	**3.0**	**2.3**
Woodland - Exmoor Woodland Project officer	5	3	3	4	4			0	**0.0**	**5.0**	**3.2**
Woodland - Working Woodland Project	3	0	3	4	3			0	**0.0**	**4.0**	**2.2**
Woodland - Woodland grants	3	2	2	dk	4			0	**0.0**	**4.0**	**2.2**
Woodland - New Native Woodlands in National Parks	3	1	1	4	3			0	**0.0**	**4.0**	**2.0**
Heathland - ESA reactive rather than proactive	2	3	3	3	4			2	**2.0**	**4.0**	**2.8**
Heathland - ESA payment structure	4	3	4	5	3			2	**2.0**	**5.0**	**3.5**
Heathland - Difficulty entering commons into ESA	5	4	3	2	3			3	**2.0**	**5.0**	**3.3**
Heathland - Lack of flexibility in ESA	2	3	2	2	3			1	**1.0**	**3.0**	**2.2**

agreements											
Heathland - lack of grazing specification in ESA agreements	3	2	2	4	3			3	**2.0**	**4.0**	**2.8**
Heathland - Grassland entered in wrong tier of ESA	4	4	3	1	4			5	**1.0**	**5.0**	**3.5**
Heathland - Moving stock from ESA to surrounding land	1	2	3	1	3			3	**1.0**	**3.0**	**2.2**
Heathland - Lack of labour to control burning	3	4	2	5	4			2	**2.0**	**5.0**	**3.3**
Woodland - Lack of woodland markets	4	2	2	2	4			4	**2.0**	**4.0**	**3.0**
Woodland - High cost of deer fencing	4	2	3	2	3			5	**2.0**	**5.0**	**3.2**
Social											
Heathland - Advisor field visits	4	2	3	4	3			4	2.0	4.0	3.3
ENP acting as 'one-stop shop'	4	0	3	4	2			0	0.0	4.0	2.2
Heathland - Establishment of Moorland Panel	3	2	3	2	1			5	1.0	5.0	2.7
Woodland - Exmoor Woodland Project officer	5	3	3	4	4			5	3.0	5.0	4.0
Heathland - Negative perception of conservation organizations	3	1	3	5	3			5	**1.0**	**5.0**	**3.3**
Heathland - Lack of public acceptance of conservation solutions	3	2	3	2	3			5	**2.0**	**5.0**	**3.0**
Heathland - Owner acceptance of conservation solutions	3	4	3	4	3			2	**2.0**	**4.0**	**3.2**
Woodland - Fragmented ownership	4	1	2	4	3			4	**1.0**	**4.0**	**3.0**
Political											
Heathland - Attachment of environmental conditions to agricultural *subsidies*	4	5	4	5	3			5	3.0	5.0	4.3
Heathland - Adverse state of agricultural economy - neglect	3	4	3	5	3			*5*	***3.0***	***5.0***	***3.8***
Heathland - Adverse state of agricultural economy - intensification	2	4	2	1	3			5	**1.0**	**5.0**	**2.8**
Heathland - Adverse state of agricultural economy - change in stocking regime	4	4	3	5	3			5	**3.0**	**5.0**	**4.0**
Heathland - BSE 30-month rule (omitted from FFA)	3	2	dk	dk	dk			dk	**2.0**	**3.0**	**2.5**
Conflicting policies	4	4	4	4	3			3	**3.0**	**4.0**	**3.7**

APPENDIX 4 - Force field analysis summary for the Blackmore Vale Case Study

Interviewee	1	2	3	4	5	6	7	8	Min	Max	Mean
Agreement											
Partnership approach	4	5	5	3	4	5			**3.0**	**5.0**	**4.3**
Communication benefits from field meetings	5	4	4	2	3	3			**2.0**	**5.0**	**3.5**
Co-ordination/communication benefits provided by the Blackmore Vale HRP	5	3	4	3	4	5			**3.0**	**5.0**	**4.0**
Poor communication between partners	0	2	2	3	3	2			**0.0**	**3.0**	**2.0**
Need for co-ordination of partners/projects	4	4	4	4	3	2			**2.0**	**4.0**	**3.5**
Lack of co-ordination of Biodiversity Action Plans	4	2	3	3	4	2			**2.0**	**4.0**	**3.0**
Lack of consensus on woodland restoration techniques	2	2	2	4	2	dk			**2.0**	**4.0**	**2.4**
Knowledge											
Lack of specific habitat/species knowledge	4	2	4	4	4	4			**2.0**	**4.0**	**3.7**
Lack of knowledge of marginal sites	4	2	4	4	2	4			**2.0**	**4.0**	**3.3**
Poor co-ordination of knowledge	4	5	4	4	3	3			**3.0**	**5.0**	**3.8**
Lack of monitoring	3	4	3	3	2	4			**2.0**	**4.0**	**3.2**
Lack of habitat management knowledge	5	2	3	3	2	2			**2.0**	**5.0**	**2.8**
Lack of knowledge about changes in farm ownership	3	3	4	2	2	dk			**2.0**	**4.0**	**2.8**
Technology											
Indicative planning pilot project - Blackmore Vale HRP	5	4	4	4	4	3			**3.0**	**5.0**	**4.0**
Indicative planning pilot project - 'Unconscious project' by DWT	5	4	3	dk	3	dk			**3.0**	**5.0**	**3.8**
Development of GIS based on aerial photographs	4	5	3	2	0	2			**0.0**	**5.0**	**2.7**
Absence of indicative planning	0	3	3	2	3	2			**0.0**	**3.0**	**2.2**
Lack of established habitat restoration techniques	4	1	4	2	2	2			**1.0**	**4.0**	**2.5**
Need for wider dissemination of habitat restoration knowledge	4	4	4	3	4	2			**2.0**	**4.0**	**3.5**
Shortage of skilled conservation contractors	3	1	4	2	4	2			**1.0**	**4.0**	**2.7**
Need for a directory of specialist contractors/suppliers	1	4	4	2	2	2			**1.0**	**4.0**	**2.5**
Non-availability of correct grazing livestock	0	4	5	5	5	3			**0.0**	**5.0**	**3.7**
Economic											
Application of Countryside Stewardship	5	5	5	4	5	5			**4.0**	**5.0**	**4.8**
Targeting benefits provided by the Blackmore Vale HRP	5	4	4	3	4	3			**3.0**	**5.0**	**3.8**
Shift to organic farming systems	3	4	4	4	5	2			**2.0**	**5.0**	**3.7**
Local markets	2	4	3	4	3	2			**2.0**	**4.0**	**3.0**
West Dorset Food Links	2	4	3.5	3	3	2			**2.0**	**4.0**	**2.9**
Application of woodland grants	3	3	4	4	5	dk			**3.0**	**5.0**	**3.8**
Application of Challenge Funding for woodland improvement	4	5	4	3	5	dk			**3.0**	**5.0**	**4.2**

Appointment of County Woodland Officer	3	5	3	2	5	dk			**2.0**	**5.0**	**3.6**
New 'incomers' paying for habitat management	5	1	0	2	3	dk			**0.0**	**5.0**	**2.2**
Partnership funding of projects	4	5	4	3	4	dk			**3.0**	**5.0**	**4.0**
Competition for Countryside Stewardship	5	0	4	2	2	dk			**0.0**	**5.0**	**2.6**
Insufficient targeting of Countryside Stewardship	0	2	0	2	3	2			**0.0**	**3.0**	**1.5**
Need for higher incentives	5	3	4	4	5	5			**3.0**	**5.0**	**4.3**
Lack of incentives for certain land types	4	5	3	5	4	2			**2.0**	**5.0**	**3.8**
Lack of flexibility in Countryside Stewardship	4	2	1	3	2	dk			**1.0**	**4.0**	**2.4**
Lack of introductory grant aid scheme	0	4	4	2	4	dk			**0.0**	**4.0**	**2.8**
Dilution of Countryside Stewardship with Rural Development Plan	0	3	1	3	2	dk			**0.0**	**3.0**	**1.8**
High capitalisation on modern dairy farms	0	5	4	4	5	dk			**0.0**	**5.0**	**3.6**
Lack of markets for woodland products	4	4	4	3	5	dk			**3.0**	**5.0**	**4.0**
Social											
Advisor field visits	5	5	4	5	5	5			4.0	5.0	4.8
Benefit of single point of contact in Blackmore Vale HRP	5	5	4	5	5	5			4.0	5.0	4.8
Publications	3	3	4	3	3	3			3.0	4.0	3.2
On-farm demonstrations	4	4	3	4	4	5			3.0	5.0	4.0
Formation of Dorset Woodland Forum	3	1	3	3	3	dk			1.0	3.0	2.6
Lack of staff continuity	0	5	4	4	3	4			**0.0**	**5.0**	**3.3**
Need for a 'one-stop shop' / single point of contact	3	4	4	4	4	4			**3.0**	**4.0**	**3.8**
Mistrust/suspicion of conservation organisations	4	3	3	3	5	3			**3.0**	**5.0**	**3.5**
Lack of public awareness	4	3	3	2	2	4			**2.0**	**4.0**	**3.0**
Change in farm ownership - intensification as small farms bought by adjacent farms	5	3	3	3	3	dk			**3.0**	**5.0**	**3.4**
Changes in farm ownership - neglect as small farms bought by new 'incomers'	2	3	2	3	2	dk			**2.0**	**3.0**	**2.4**
Political											
Attachment of environmental conditions to agricultural subsidies	5	5	4	5	5	5			4.0	5.0	4.8
Introduction of Rural Development Regulation	3	2	4	4	5	dk			2.0	5.0	3.6
New Forestry Strategy	3	3	4	4	2	dk			2.0	4.0	3.2
Woodland Assurance Scheme	1	2	3	4	3	dk			1.0	4.0	2.6
Adverse state of agricultural economy - neglect	2	3	4	3	5	dk			**2.0**	**5.0**	**3.4**
Adverse state of agricultural economy - intensification	4	5	4	4	5	dk			**4.0**	**5.0**	**4.4**
Adverse state of agricultural economy - change in stocking regime	5	4	4	5	5	dk			**4.0**	**5.0**	**4.6**
Need to move from agricultural production payments to area payments	5	4	0	3	4	dk			**0.0**	**5.0**	**3.2**
BSE crisis	5	5	4	4	5	dk			**4.0**	**5.0**	**4.6**
Development pressure	4	1	0	2	0	dk			**0.0**	**4.0**	**1.4**