

Spatial planning for biodiversity in our changing climate

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Spatial planning for biodiversity in our changing climate

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Executive summary

The issues:

- How will biodiversity be affected by climate change and what is needed to help it adapt?
- How can spatial planners help biodiversity adapt to climate change?

Study findings:

- Climate change is already affecting and will continue to affect wildlife habitats and species.
- To help wildlife and habitats adapt to climate change, biodiversity and land managers and many other stakeholders in the environment will need to take specific measures with this aim.
- Spatial planners can play a vital role in enabling wildlife to adapt, via policy and practical measures, often working in partnership with others.
- Some of these measures (eg SEA, EIA, master-planning) are already in place and understood but planners may need guidance and encouragement to use them, as many uncertainties exist - for instance with regards to impacts of climate change, the response by biodiversity and the likely effectiveness of any measures. Other approaches need further development – such as integrated planning and river basin management planning.
- Whilst the uncertainties will remain, it is recognised that action is needed, bringing together approaches which will protect habitats and species, will promote their resilience to climate change, and will also provide opportunities for the future. At the same time, a view to the broader picture is needed, encompassing planning for other sectors, such as water, infrastructure and development.
- If this is done, then biodiverse landscapes in rural, urban, coastal and inland areas can be safeguarded for future generations. At the same time, other social, economic and environmental benefits can be achieved by doing this, such as maintaining or enhancing quality of life and ensuring more sustainable development.

Context

As part of the BRANCH programme (Biodiversity Requires Adaptation in Northwest Europe under a CHanging Climate), research has been undertaken to review spatial planning policy relating to biodiversity and climate change, across the three partner countries of France, Netherlands and UK (England). The study methodology included the review of national policies and planning documents at various levels, followed by consultation with policy-makers and planners at workshops in Winchester, The Hague and Brussels, and interviews in northern France.

Climate change modelling and socio-economic scenarios provide a complex picture of likely climate change over the period to 2050. Unavoidable change will happen as the result of past emissions and attempts to mitigate climate change via emissions reduction cannot avert this. Though it is not yet possible to predict with certainty and precision what form the changes will take, there is some consensus on warmer and drier summers, and milder and wetter winters in NW Europe, with increased risk of storms. Research into the impact upon

biodiversity is in progress and has identified consequences including phenological changes and loss of habitats and species, as well as species invasion and migration. Spatial planning has a role to play in finding ways of enabling species to survive and adapt to climate change, through measures that protect and enhance biodiversity and measures that control the impacts of human activities, or safeguard areas of current or future importance for biodiversity in the light of a changing climate. Many of these measures will also provide other benefits both for the support of ecosystem functions and for human quality of life.

Spatial planning, biodiversity and climate change in NW Europe (sections 2 & 3)

The policy review and consultation process has shown that spatial planning in the three countries is in many ways still getting to grips with aspects of biodiversity planning. There is increasing recognition of a dynamic and flexible approach to biodiversity planning and management, which goes beyond the static concept of protection of designated sites and emphasises the value of the wider landscape (including urban areas) and the opportunities for habitat enhancement and creation through the spatial planning or development process. Evidence of this more flexible approach can be seen in policies for managed realignment at coastal sites. In addition, the wider benefits of biodiversity and ecosystems for human health and well-being are now beginning to be recognised in policy making.

Planners and policy-makers and others in many authorities and organisations will need to take a role in addressing the direct and indirect impacts of climate change on biodiversity. There are measures and approaches available to take action, for example in the field of spatial planning, but they may need wider recognition. Shortcomings in the spatial planning process were identified; leadership and guidance are needed with regards to timescales, appraisal tools, implementation powers and more information on appropriate measures and likely success. The recognition of the importance of ecosystems in assisting with adaptation to climate change is a first step. A dynamic and flexible approach is needed, given uncertainties about future change, and the varying needs and dispersal capacities of wildlife species. Overlapping plans and strategies affect sites of importance for wildlife, and there may be conflicting policy objectives, including socio-economic objectives.

The findings show that, while climate change adaptation is another new issue for spatial planning, and it may be too early to find much evidence of practice on the ground, this is a good moment to argue that integrating biodiversity adaptation with climate change evidently requires recognition of dynamic systems.

Potential approaches and examples (section 4)

Three levels of approach to biodiversity conservation and enhancement under climate change are discussed. These are: the level of sites and habitats (and networks between them); the level of the wider landscape and the improvement of its quality, and the level of ecosystem planning.

Five case studies are introduced in the report. They demonstrate how climate change, with other pressures, is affecting biodiversity at these diverse sites. The cases review the planning and management measures now in place and the context within which they are set. The cases cover terrestrial, wetland, urban and coastal locations. At coastal sites there is evidence of sea level rise leading to coastal erosion, 'coastal squeeze' between rising seas and flood defences, and coastal flooding. There are many existing plans and policies, some mutually

conflicting, as a result of multiple pressures on the coast, including tourism and recreation. At terrestrial sites, in addition to climate change impacts, there may be fragmentation of landscapes, but there are also potential links to adjacent habitats, including those across borders.

Conflicting policy aims result from development and other pressures. There are funding issues for biodiversity enhancement. Interaction between biodiversity planning and water and flood policies can be seen in the case studies and these issues have been highlighted at workshops – there are opportunities for biodiversity conservation in improved water planning measures. At both coastal and terrestrial sites there is a need for integration of the various planning initiatives and policies. Examples of approaches to help with biodiversity conservation now in place are outlined, including opportunities mapping and habitat restoration.

Review of EU policy (section 5)

Review of EU policy has shown how the interaction of climate change, biodiversity and spatial planning has been understood at the European level. Policy instruments (directives and strategies) have potential for addressing adaptation, and supporting the further policy responses now under development. The requirements of the Water Framework Directive to integrate river basin management with the requirements of the Birds and Habitats Directives, and the provisions made for the links between EIA, Strategic Environmental Assessment (SEA) and the Habitats Directive (both in guidance documents and by the European Court of Justice), show how this legislation could contribute to implementing wider EU environmental policy.

There has been as yet no evident integration of the need for climate change adaptation into EU economic, regional, agricultural, spatial, water environment or biodiversity policies or measures. At the European level the focus until recently has been upon mitigation through the Kyoto process and achieving emissions targets. This is gradually shifting, with some possible reforms underway during 2006. The Lisbon agenda, promoting EU competitiveness, was seen by BRANCH workshop participants as a possible obstacle to appropriate action and policy evolution on climate change and biodiversity.

Implementation of policy (section 6)

It was acknowledged that measures are needed by planners and policy-makers to assist in the stages of policy development and implementation, in order to build resilience of sites and species to climate change. This will include a hierarchy of measures to address ecosystem functioning, together with protection and restoration of sites, protection of habitats, and enhancement of the wider landscape, in order to provide the necessary conditions for biodiversity in a permeable and resilient landscape. Measures that can assist planners in biodiversity conservation under a changing climate include the appropriate review and appraisal of spatial plans, to take into account both plan impacts and cumulative impacts of other activities and policies. Where development projects are proposed, assessment of environmental impacts must also incorporate consideration of climate change impacts and likely future climates.

Biodiversity protection at sites alone is not sufficient. Research suggests that landscapes need to be 'permeable' to wildlife and this may involve matters beyond the powers of

planners to address, so partnerships with a range of authorities, agencies and organisations are needed to raise the quality of the wider landscape for wildlife. The maintenance of ecosystem functions is important for biodiversity conservation, and improving conditions for biodiversity will help in promoting functions such as flood mitigation and water supply. To achieve this it will be necessary to integrate planning for biodiversity and for climate change into other aspects of policy (such as water, transport and development) in order to prevent fragmentation of habitats and other adverse impacts upon environmental quality.

The multiple benefits deriving from ‘green infrastructure’ and other forms of biodiversity protection have been indicated, as policy-makers will be encouraged to seek ‘win-win’ options.

Recommendations and opportunities for action (sections 7 & 8)

A long list of recommendations for action at policy and more practical level is given, classified into the various levels of the policy-making hierarchy: EU level, national level, and regional and local level. The recommendations cover policy development to include climate change impacts upon biodiversity, modified procedures for plan-making and the appraisal of plans and projects.

Specific spatial planning measures include the climate-proofing of plans (both statutory and where possible non-statutory plans); EIA and SEA; the integration of plans via common objectives, time horizons and boundaries; river basin management planning; risk assessment and ecosystem planning. Implementation at local and regional level will include opportunities mapping, site safeguard policies, partnership working, landscape frameworks, legal agreements and land market interventions.

There is now compelling evidence of future impacts of climate change upon biodiversity and nature conservation. The report identifies forthcoming important opportunities in the policy-making process relating to the environment, climate change and biodiversity, in order to prompt action to take advantage of these.

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Research Information Note

1 Introduction

1.1 BRANCH programme

BRANCH (Biodiversity Requires Adaptation in Northwest Europe under a CHanging Climate) is a three-year multi-partner, multi-project programme aiming to identify, develop and advocate spatial planning mechanisms to allow for the adaptation of both terrestrial and coastal biodiversity habitats to changing climate in northwest Europe. BRANCH will provide the evidence and recommendation to support policy and planning at all scales in northwest Europe by taking further the science underpinning how wildlife is likely to respond to the changes; the present report is the first step in this process. English Nature is the lead partner in this programme, bringing together partners in South East England, the Netherlands and France. BRANCH is funded within the EU's Interreg III programme

The aim of this policy review project is to identify mechanisms which can be used at European, national, regional and local scale to facilitate spatial planning for changing biodiversity with climate and sea level change. The mechanisms and recommendations are derived from a review of the adequacy of currently available mechanisms, and the obstacles that remain. The BRANCH programme intends to test some of these recommendations, and this will be reported elsewhere.

1.2 BRANCH policy review: policy response to climate change

1.2.1 Awareness of climate change

Awareness of and policy response to climate change has been growing over a rather short period (5 - 15 years) as evidence of climate has become more compelling. In each of the partner countries a process is under way, developing from awareness to action. Different stages in that process have been reached as the countries move from early recognition of climate change and identification of specific impacts upon sectors and regions, to an understanding of the need to not only mitigate impacts but also adapt to climate change effects at sectoral level, such as in biodiversity planning, spatial planning and infrastructure planning.

At national and regional level scientific research is being commissioned and information is becoming available at increasingly local scales, whilst local observation prompts greater awareness, such as of phenological changes.

To date, many of the policy responses, certainly at national level, have been dominated by mitigation. The premise of our approach is that mitigation measures, though necessary, are likely to be inadequate to safeguard the richness and dynamism of our biodiversity for the following reasons:

- Even with mitigation, northwest Europe will be faced with the consequences of climate change over the next 30 years at least.
- Mitigation will not buffer the impact of changing sea levels as a consequence of isostatic re-adjustment being experienced particularly in northwest Europe.
- Some habitats will change in extent and character and distribution.
- Some species will change in extent, character and distribution.

- Direct cause and effect is likely to be difficult to determine. Hulme (2005) has stressed that ‘Vulnerability to change will be determined by the frequency and magnitude of extreme events and not necessarily on average events or changes in average events. The capacity to adapt will vary with the specific ecosystem, region and through time’.

The further premises we have adopted are:

- Change can be seen as an opportunity as well as a threat. Planning for change can manage (perceived) risks.
- Our biodiversity heritage and legacy is important in its own right. It is also fundamentally important as part of the environmental, social and economic fabric of northwest Europe. Therefore planning for the coming change will have far-reaching value.

Nevertheless, the process of policy development addressing climate change impacts in general is faced with a number of obstacles, such as:

- Uncertainty (about the extent and timescales of climate change, including uncertainties in the models and in their assumptions about emission levels; and uncertainty about the powers available to address climate change causes and impacts);
- resourcing (shortage of skills, time, funds);
- gaps in information (for instance, about the impacts of climate change and the effectiveness of potential adaptation measures, etc.); and
- competition for policy-makers’ time.

1.2.2 Project purpose

The purpose of the BRANCH project overall is to provide guidance that is relevant and transferable across northwest Europe (and perhaps wider). There are many similarities in the planning systems of EU countries and measures proposed here should exploit available routes or adapt existing procedures to best effect. Some existing EU measures offer scope for including in the planning process measures which will assist species and habitats to adapt to climate change – in particular, the Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) Directives and the Water Framework Directive (WFD). These provisions are in place and the project aims to review their applicability and their use.

1.2.3 Document review and BRANCH workshops

The spatial planning policy aspect of the BRANCH programme has involved the review of spatial plans and policies which are of relevance to climate change and biodiversity, as well as plans of other sectors having a potential impact upon biodiversity (such as water and transport). This work covered France, the Netherlands and the UK at national level, as well as regional and local levels. Issues relating to EU level policy were also reviewed. The document review stage was carried out during the summer of 2005, with some additional material included later, partly in response to issues raised at the workshops. It must be stressed that this is a fast moving field, with spatial plans continually being prepared and

adaptation policy gradually moving up the agenda, so whilst the broad picture from the review remains accurate, the detail is changing.

Following the initial review of existing policy, workshops were held by the project consultants in Winchester (October 2005) and in The Hague (December 2005), to elicit up-to-date information and views from individuals closely involved in spatial planning, biodiversity and climate change issues. These workshops have helped provide information on awareness, obstacles, perceived needs and potential measures. A subsequent workshop – held in Brussels in January 2006 – aimed to bring together those involved in the policy process at the EU level to explore with them current action and necessary or desirable future action on planning for the adaptation of species and habitats to changing climates.

1.2.4 Report structure

This report is made available as a resource for future policy development. It summarizes the process and findings of the BRANCH policy review and workshops, and leads into a set of recommendations for spatial planners and policy-makers dealing with biodiversity and climate change. Following the introduction, current expectations of climate change across northwest Europe are summarized in Section 2 for the period to 2100, including an overview of biodiversity impacts seen so far. Current strategies and approaches to manage these responses in the three partner countries are presented in Section 3 and a set of approaches and case studies from these three countries is presented in Section 4. Section 5 outlines the EU position with regards to spatial development, biodiversity planning and climate change. Section 6 discusses implementation of policy and sets out a range of measures which might be used to prepare for unavoidable impacts and promote resilience.

Recommendations drawn from the present review and analysis are summarized, grouped by planning levels: Section 7 covers EU to local levels, and Section 8 briefly indicates what opportunities currently before planners and policy makers might be used to bring forward an appropriate response to climate change impacts upon biodiversity. Information sources and further reading are indicated: Annex 1 gives further details of the literature review, Annex 2 summarizes the EU directives of relevance to this topic, and Annex 3 outlines proceedings and the project workshops.

A glossary of terms and abbreviations is given on page 87.

2 Spatial planning, climate change and biodiversity in northwest Europe

2.1 Spatial planning and its role in relation to biodiversity and a changing climate

Spatial planning, as understood in this report, involves the setting of goals and implementation of actions for the short and longer-term of land uses and land-based activities and their interactions. Spatial planning includes both existing land uses and development, and new development, infrastructure and built form. We have defined the scope of the study to include terrestrial and coastal planning, but not planning for the wider marine environment.

Biodiversity offers important direct benefits through the inherent value of species and habitats, and biological products, but also indirect benefits. For instance, it can provide general eco-system functions such as maintaining the quality of land, air and water, and specific functions such as the role of wetlands in flood mitigation (European Environment Agency 2003); it also contributes significantly to the distinctive quality of places, and to people's quality of life, health and well-being. Spatial planning for biodiversity therefore has important roles both in protecting and safeguarding internationally and nationally designated and valued sites (such as the Natura 2000 network) and species, and locally valued sites in urban and non-urban areas, and in the creation of new opportunities for biodiversity through the development process.

Spatial planning works to a range of time-horizons: national or regional level plans may have horizons of up to 25 years, with local plans having a shorter time-scale. But as the outcomes of spatial planning in the form of built development are likely to have a life of 60-100 years, and in some case longer, it is important that spatial planning takes account of the changing climate that will be experienced (EEA 2004) during the 21st century. Spatial planning for biodiversity, therefore, should also consider what the implications of climate change will be for biodiversity, including the implications on policy for the conservation and safeguarding of designated sites, and should provide opportunities to assist biodiversity to adapt to those changes.

In the partner countries of this Interreg III study, spatial planning is a function of central government, provincial or regional government, and local government. The European Union does not have a specific mandate for spatial planning, but it does publish relevant initiatives such as the European Spatial Development Perspective and thematic strategies, which the study reviews. Moreover, European directives, such as those for Habitats and Birds, Strategic Environmental Assessment, Environmental Impact Assessment and the Water Framework Directive, do require the appraisal of spatial plans for their impacts on biodiversity. Opportunities therefore exist for the involvement of biodiversity agencies, both governmental and non-governmental, in the spatial planning process.

2.2 Broad climate projections and uncertainties

2.2.1 Projections

Climate change research is being conducted at global, European and national levels. The areas of research cover observation and predictive modelling, scenario-building, impact prediction and assessment, mitigation research and, most recently, research into adaptation possibilities across activities and sectors. The projections quoted in this report, and used in the workshops carried out for the project, are principally based on work by the Intergovernmental Panel on Climate Change's *Third Assessment* report documents (see IPCC 2001a, b and c), by the European Environment Agency (EEA 2004; Voigt and others 2004), and documentation prepared under the UK Climate Impacts Programme (see: www.ukcip.org.uk).

Expectations of climate change in northwest Europe are summarized below; more detail on these projections is available from the sources referenced. Projected changes relate to temperature, precipitation and wind speed in the four seasons at stated points in the future (referred to as the 2020s, the 2050s and the 2080s, but each covering a longer period). The climate change scenarios are based on the Special Report on Emissions Scenarios developed by IPCC, which include socio-economic scenarios (IPCC 2000). In order to reduce the complexity associated with these emissions scenarios and time horizons, a set of broad-brush indicators has been used for the purposes of this study. These are summarized in Table 2.1.

Box 2.1 summarizes scenarios of climate change in southeast England and the Netherlands. The picture for southeast England represents the position under the political and socio-economic circumstances of the medium-high emissions scenario by 'the 2050s' (ie within the period 2040 to 2069). For a discussion of political/socio-economic scenarios, see UKCIP (2001). It should be noted that studies show that some socio-economic drivers are likely to be as important as, or more important than, climate change (such as CAP reform and agricultural change). The present BRANCH study has not been required to address these wider drivers.

Box 2.1 Future climate scenarios

Climate of southern England in 2050s (*Medium-high emissions scenario*)

- Average annual temperature: 2.0° – 2.5°C rise
- Summer precipitation: reduced by 20 - 30 mm/day (avg.)
- Winter precipitation: increased by 10 – 20 mm/day (avg.)
- Extreme events: higher maximum temperatures, more heatwaves, fewer frost days, more intense rainfall events, storms
- Also: sea level rise: mean sea level projected to rise by 0.09 to 0.88 m by 2100, but with significant regional variations (IPCC 2001c). Also: storm surges?

Source: Hulme and others (2002)

Future climate of the Netherlands

The Royal Netherlands Meteorological Institute has also developed scenarios of climate change based on IPCC data. Three 'wet' scenarios for 2100 and a 'dry' scenario for 2050 indicate temperature rise of between 1° and 6°C by 2100 (or <6°C by 2050 under the dry scenario). Climate expectations listed are: more rain, uncertainty with regard to storms, more heat waves and fewer cold spells.

Source: Netherlands Environmental Assessment Agency 2006

Table 2.1 Past and expected future climate trends, northern Europe*, and confidence level

Indicator	Past trend (20th century)	Projections through 21st century	Confidence level
Air temperature	Europe: mean annual temperature rising: +0.95°C Summer +0.7°C Winter +1.1°C	Global projection (1990–2100): inc. by +1.4 – 5.8°C Europe: +2.0–6.3°C	Very high
Temperature extremes	1976-1999 - number of cold and frost days decrease - number of summer days increased	- cold winters disappear almost entirely by 2080 - hot summers much more frequent	
Precipitation	Heterogeneous trends (1900– 2000): - northern Europe 10- 40 % wetter - southern Europe up to 20 % drier Increase in extreme events	2% increase per decade for northern Europe Likely more frequent droughts and intense rainfall events	Low
River discharge		Small changes across mid-northern Europe (n.b but flooding has occurred)	
Sea level	Sea levels around Europe increased by 0.8 -3.0 mm/yr	Projected SLR 2000-2100 is 2.2-4.4 times higher (0.09 to 0.88 m). Sea level projected to continue to rise for centuries	Very high
Windspeed - storms and storm surge	Highly uncertain, but evidence for a small increase in annual wind energy over northern Europe, particularly during winter (Pryor and others 2005)		Very low

Sources: European Environment Agency (2004), Voigt and others (2004) and IPCC (2001c) for trends, Hulme (2005) for confidence levels (Note *: 'northern Europe' as described in EEA 2004).

2.2.2 Uncertainties

It is acknowledged that there are uncertainties associated with climate prediction during the coming century. With regards to the past trends indicated in Table 2.1, there are uncertainties associated with data availability: availability is good for temperature, rainfall, frost days and other meteorological data, but poor for biodiversity, health, etc. There is also uncertainty surrounding the attribution of trends to climate change. Whilst the attribution of temperature change to climate change is considered to be sound, it is more difficult to attribute climate extremes (such as droughts or heavy precipitation) to climate change.

Uncertainties about future socio-economic scenarios and technological change and the consequent uncertainty about future emission of greenhouse gases are challenging areas (UKCIP 2001). There are some uncertainties in the choice of and formulation of models used for prediction. Hulme and others (2002) point to the sensitivity of models to the uncertainty inherent in future climate predictions. Global temperature models are assessed as being relatively robust, but there is more uncertainty surrounding regional precipitation levels and extremes in precipitation. In addition, there are gaps in knowledge, for instance of species' dispersal capacity and the natural adaptive capacity of ecosystems¹, as well as the complexity of species' interactions and the difficulties in representing dispersal functions. There are of course also uncertainties in the response of sectors such as biodiversity, health, and agriculture to future climate change, although modelling work (such as that being undertaken for the BRANCH project) is adding to our understanding of climate space for certain species.

Nevertheless, researchers stress that all indicators show a clear trend, indicating that the impacts of climate change are already apparent in Europe and that 'more severe consequences are expected in the future' (Voigt and others 2004).

Mitigation of climate change impacts, ie undertaking measures to reduce emissions of greenhouse gases to the atmosphere (via energy conservation, use of renewable sources, etc.), will not be able to counter the climate change that is already built into the system: some measure of climate change is inevitable as a result of past emissions to the atmosphere. To deal with the effects of climate change we must also take measures which enable species to respond to climate change by moving to more suitable habitats once their existing habitats lose their previous character (for instance following changes in water relations).

2.3 Climate change impacts upon biodiversity

The predicted changes in climate indicated above are forecast to have impacts upon biodiversity across the spectrum of environments. Direct impacts may lead to changes for example in phenology, whilst indirect impacts may result from other changes, for example, in frequency, magnitude and duration of drought. Furthermore impacts may be exacerbated by interactions with other variables which react to climate change, particularly agricultural land use, and the use of water. Other changes - such as population change and urban or infrastructure development - will also put pressures on biodiversity. Resulting effects may include habitat loss and changes in the species balance at sites.

¹ IPCC (2004) states that ecosystems with limited adaptive capacity are expected to suffer biodiversity impacts from climate change if average global temperature rises at 1- 2 °C per 100 years. Leemans (2005) reduces the 'safety limit' for acceptability/adaptability to 0.5°C per century, and 1.5 °C overall.

Table 2.2 Examples of impacts at site types, and cumulative impacts

	Climate change impact	Other (cumulative) impacts
Rural		
moorland	peat drying and fire risk during hot summers	tourism impacts (McEvoy and others 2006)
beech forest	loss due to declining groundwater level	
floodplain	damage to nesting sites during flood events (Ratcliffe and others 2005)	encroachment of housing and other development.
Coastal		
saltmarsh	loss with rising sea level through erosion and/or inundation	disturbance activity of ragworm preventing accretion (Wolters and others 2005)
grazing marsh	low water levels in spring and winter leading to sub-optimal conditions for breeding waders (RSPB undated)	pressure for water resources
cliff habitats	faster erosion with more frequent storms (National Trust 2005)	coastal protection schemes can interrupt the movement and deposition of sediment
Urban		
parks and gardens	drought leading to loss of lawns; species invasions	residents' choice of hard surfaces ('urban creep') and exotic species
brownfield	species invasions	development

2.4 Summary and key findings

Climate change modelling and socio-economic scenarios provide a complex picture of likely climate change over the period to 2050. Change will happen as the result of past emissions and is unavoidable. Though it is not yet possible to predict with certainty and precision what form the changes will take, there is some consensus on warmer and drier summers, and milder and wetter winters in northwest Europe, with increased risk of storms. Research into the impact upon biodiversity is in progress and has identified consequences including phenological change and loss of habitats and species, as well as species invasion and migration. Spatial planning has a role to play in finding ways of enabling species to survive and adapt to climate change, through measures that protect and enhance biodiversity and wide-ranging, integrated policies across the sectors, enabling the necessary changes and adaptations to take place.

Key findings

- Projected climate change over the 21st century will have impacts for biodiversity across northwest Europe as a result of warmer drier summers, milder wetter winters, sea level rise and increased storm damage and storm surge.
- Other impacts, especially from development, water demand, habitat fragmentation and agricultural change may act in combination or cumulatively with climate change effects.
- Whilst uncertainties remain, there is sufficient evidence to suggest that action needs to be taken to protect and maintain biodiversity from climate change impacts by enabling species to move to new habitats or by increasing the resilience of habitats and networks of habitats.
- Climate change may also bring opportunities for biodiversity and these opportunities should be planned for and taken.

3 Planning strategies and approaches for biodiversity under climate change (within partner countries)

This section brings together the findings of the review of literature and planning policy, the findings of two BRANCH workshops, and the interviews with French policy-makers to present and analyse the shortcomings of current practice, as a basis for the recommendations made. Perceived shortcomings and issues in spatial planning at EU and national level were subsequently put before a group of policy analysts and policy makers working at EU level – the results of that exercise are incorporated into Section 7.

3.1 Summary analysis of current spatial planning

3.1.1 Review: research approach

The approach taken to identify strategies, approaches and issues arising in connection with climate change impacts upon biodiversity was two-pronged, consisting of literature review on the one hand, and two national workshops. The literature review covered national, regional and local/municipal spatial plans and policies and plans and considered their treatment of the interaction of climate change with: land, landscape, natural resources, water, coastal zones and biodiversity. Plans for designated sites at national, regional and local level were also reviewed, as well as plans for coastal zone management. A number of other biodiversity strategies and action plans were also reviewed (see Annex 1).

Key stakeholders across spatial and biodiversity planning were contacted for information on relevant plans and policies and for their views on obstacles, issues and possible future measures. These stakeholders included staff of environment and conservation agencies, spatial planning and environment ministries, planners at regional and local levels, and staff of organisations and authorities with responsibilities for managing protected and other sites. Case studies, developed to demonstrate the issues arising from climate change impacts in urban and rural, coastal and inland sites and the planning measures in place, are reported in Section 4.

Two national workshops were held: in Winchester, UK on October 11 2005 and in The Hague on 15 December 2005. Details of the management and participation in these workshops are given in Annex 2, but essentially participants representing both planning and biodiversity bodies were invited to discuss a structured set of topics to identify:

- current awareness of climate change and biodiversity;
- the obstacles to better spatial planning to enable adaptation by species and habitats; and
- what is needed to overcome these obstacles (including policy development and practical measures, information and tools needed).

Review criteria Review criteria used for the assessment of existing plans covered

- acknowledgement of climate change;
- reference to climate change time-scales and plan horizons;

- identification of impacts of climate change on biodiversity and natural resources;
- identification of impacts on natural processes;
- mention and identification of any cumulative and synergistic impacts.
- In reviewing the forward planning measures proposed, criteria used covered
- adaptive capacity identified and adaptation measures proposed;
- recognition of the need to work with changing environments;
- assessment of existing practice;
- recognition of climate change impacts within both valued habitats and the wider landscape;
- mention of compensatory provision of sites for biodiversity;
- mention of the possible safeguarding sites for restoration as biodiversity sites for the future;
- recognition of areas of conflict and potential for compromise.

3.1.2 France

Further details of the policy review are presented in Annex 1 and responses to questionnaire survey are summarized in Annex 2. Key findings are as follows.

- The French Strategy for Sustainable Development was commenced in 2003, with a five year timetable.
- France has an established national plan on climate change and has published preliminary work on adaptation (ONERC 2005).
- Interviewees pointed to mixed and complex messages on climate change, with the link to biodiversity rarely made.
- A low level of understanding of the issue at all levels was reported by interviewees, with poor communications, piecemeal availability of biodiversity data.
- Staffing and financial resources available for this policy area are currently low.
- The French spatial planning system emphasises different territorial levels with respect to climate change.
- The evidence of integration between plans and between levels of planning is not clear.
- There is recognition of the need for, and action involving a shift away from hard engineered approaches to the dynamic coast.

3.1.3 Netherlands

Again, more detail on the documentation review for the Netherlands is provided in Annex 1 and of the workshop at The Hague in Annex 2. Key findings for the Netherlands are that:

- The National Environmental Policy Plan is acknowledged as the equivalent of a Dutch sustainable development strategy.

- The national response to climate change is enacted via the integration of policies and commitment to flexibility via the National Spatial Policy Document *Nota Ruimte* (2004).
- The national BSIK Research programme (aimed at improved the Dutch ‘knowledge infrastructure’, includes the ‘Climate Changes Spatial Planning’ initiative. The initiative will lead to the creation of a multi-stakeholder *Network on Climate & Spatial Planning* and a set of *projects* addressing interdisciplinary knowledge questions.
- Adaptation for climate change is an issue in at least one Provincial Plan (for Limburg), where water management issues (chiefly, flooding) are also highlighted. The Limburg ‘robust corridor’ is approved within this plan.
- Coastal zone management plans are in place in the Netherlands for the short term (<5yrs), the medium term (<30 yrs) and the long term (up to 100 yrs).
- There is a shift in progress towards policies which promote working with dynamic coastal processes.
- The National Ecological Network (EHS) has been established and robust corridors for wildlife are in the process of designation and restoration via creation of new nature areas and the enlargement of existing and local ecological corridors.
- Provincial Water Management Plans take account of climate change
- There is evidence of cross-boundary and inter-provincial co-operation on climate change issues.

3.1.4 UK (England)

Further details of the policy review are presented in Annex 1 and the findings of the Winchester workshop are detailed in Annex 2. Key findings from this review and consultation were that:

- At national level climate change is recognised as an important and current issue, not merely one of interest in the long-term (HM Government 2005). Policies to guide adaptation are only recently being formulated (ODPM 2004), and are still rather non-specific, particularly with respect to biodiversity. (A PPS on climate change mitigation via carbon emissions reduction is to be prepared, HM Government 2006).
- English national policy on biodiversity and climate change as issued by English Nature recognises the need to act in ways that respond in a dynamic manner to climate change, and this is illustrated by policy on managed realignment at the coast in circumstances where ‘holding the line’ is recognised as no longer sustainable. The agency has presented guidelines for land managers and biodiversity managers that propose a three-level approach to biodiversity and climate change: site protection, the wider landscape and the level of ecosystem functioning. See: English Nature (2005), Hopkins and others (2005), and Burn & Collins (2005)
- There is no national spatial planning framework for England
- At regional level climate change is recognised and specific strategic landscape measures have been devised in some regions, for example, in the Draft South East Plan *Core Regional Policies* (SEERA 2005).

- In some cases there have been proposals for the creation of landscape features, such as stepping stones and green corridors, and to consolidate existing networks linking wildlife sites.
- Additional measures undertaken of value in the protection and promotion of biodiversity are the restoration and enhancement of rivers and wetlands.
- As in The Netherlands, there is a shift in policy from coastal protection to working with natural coastal processes and ‘managed realignment’.

3.2 Emerging issues

3.2.1 Shortcomings of national spatial planning processes with respect to climate change

On the basis of the policy review, and workshops and interviews, a set of issues has been identified which relates to the nature of plans and policies. These include:

1. The issue of **leadership** for planners was raised at both workshops – which institution should direct the response to climate impacts upon biodiversity? Ensuring good communications between stakeholders, reducing conflicts, is an important responsibility of this role.
2. **Implementation powers** are necessary to fulfil responsibilities. The study has found that planners in England and the Netherlands do not have powers for direct implementation of appropriate measures, but generally must rely on indirect implementation, for instance via planning conditions and obligations. Not all existing plans are statutory in nature – the implementation of non-statutory plans is not guaranteed.
3. There are **gaps in policy guidance** on biodiversity and climate change, as well as a lack of specific guidance. In some cases guidance is being formulated but it is not yet complete².
4. The appropriate **time-scale** of response – many plans (with the exception of some Dutch plans) are relatively short term in comparison with the period over which climate change is forecast (eg 5-10 years in comparison with predictions made for climate change over the coming century).
5. Administrative / functional **boundaries** will rarely coincide with the natural boundaries which are relevant to wildlife³. This is an issue at local but also at the international level.
6. There was consensus that in order to enable biodiversity to be maintained there is a need for recognition of **the dynamic situation** and protection of existing semi-natural habitat, creation or re-creation of habitat targeted to increase the potential for connections between sites, and a more ‘permeable’ landscape. This would require a strategic and flexible approach with land earmarked and safeguarded for biodiversity.

² for example, the UK’s Environment Agency policy guidance for planners at regional and local level, now in draft, and covering biodiversity and climate change amongst other issues, should become available during 2006.

³ For example, rivers are often at the edge of administrative units, rather than at the centre of a unit defined by a catchment. However, river basin management plans under the Water Framework Directive are catchment based.

7. The wealth of **overlapping plans and initiatives**, and poor integration of social, economic and environmental objectives has led to potential for **conflicts between policy aims**. Plans typically call for partnerships, and within these partnerships topics such as economic development, tourism or land protection interests may dominate biodiversity interests.
8. Amongst both scientists and policy makers there are **uncertainties** about the extent of future climate change; the lack of consensus about appropriate intervention measures is also seen as an obstacle to progress. Habitat creation is not gardening. Biodiversity response cannot be planned exactly so it may be best to focus on functions rather than species in order to achieve suitable colonisation of sites.
9. Biodiversity and climate change have a **low profile** within the various national, regional and local plans, whether issue-specific or with integrated functions.
10. **Skills shortages** in planning; these often result from changes to planning systems, with impacts for the delivery of planning policies.

3.2.2 Other emerging issues

A further set of comments, not directly under the control of spatial planners but relevant to their work, was identified.

Links with water

Activities in the **water supply/drainage industry**, such as inter-catchment transfer, reservoir building and water abstraction may have significant consequences for aquatic, wetland and terrestrial biodiversity, particularly where species may be under stress as a consequence of direct impact of climate change such as drought conditions.

Flooding: Fluvial, groundwater and coastal flooding and protection against flooding are also key issues. It was noted that where flooding has been severe in recent years, eg in the Netherlands, this has acted as a trigger for action on climate change. Security from flooding is a key issue in the Netherlands and workshop participants at The Hague debated the merits of linking biodiversity strongly to the flooding agenda in order to achieve greater funding and prominence for biodiversity. However, the approach was controversial and others thought it might lead to a lower profile for biodiversity.

The promotion of infiltration across catchments may require restrictions on some activities within floodplains. The increasing replacement of permeable surfaces in residential areas by impermeable surfaces ('urban creep' caused by house extension, lawn replacement, etc) may fall outside planning powers, as in the UK.

Interaction with other sectors and pressures

Various economic sectors interact with biodiversity planning. Activities and developments within the **agriculture sector** are seen to be of particular importance for biodiversity, because of impacts upon the wider landscape 'matrix' and the potential of agricultural and forestry land as a conduit for migrating/moving species.

Climate change impacts may act cumulatively and synergistically with impacts resulting from other sectors (housing or economic development) or with other pressures (policy or demographic change) but typically there is little assessment of **cumulative impacts**.

Land-related issues

The wider landscape: Emerging issues are identified as a lack of permeability, a lack of routes for dispersing wildlife, insufficient space for biodiversity /wildlife and the fragmentation of landscapes via infrastructure and other development.

Urban areas: The network of parks, gardens, semi-natural and brownfield areas or ‘green infrastructure’, is important for biodiversity.

Research is demonstrating how species might move northwards or to higher altitudes in response to climate changes⁴, highlighting the varying **dispersal ability of species**. Providing permeable landscapes will not help all species to move: species with poor dispersal capacity are likely to need assistance with translocation to new sites.

Relations with the public

Public awareness: Public awareness of climate change has been stimulated by weather events – eg the French heatwave of 2003. Whilst the public is now more aware that some degree of climate change is unavoidable, it is far less aware of likely impacts upon particular sectors, for example, impacts upon biodiversity. Public interest in biodiversity is rather variable, though many public campaigns (eg various BBC campaigns, the Natuurkalender on phenology in the Netherlands) appear to successfully promote interest. Linked to this is a conservative sensitivity about change, especially in treasured landscapes, and this may become an obstacle to early adaptation.

Broader **leadership** (beyond planning) was also discussed: the need for a public position to be taken at the highest level in government to emphasize the importance and threat of climate change impacts to biodiversity.

3.3 Knowledge gaps

In addition to continuing uncertainty about the impacts of climate change upon species and habitats, the review of plans and policies and the workshops identified gaps in knowledge of potential planning measures and on the other hand, further information on biodiversity and habitats which might be used as robust evidence and tested at inquiry.

Potential planning measures

- What are appropriate planning responses?
- What opportunities exist for the range of possible measures and actions?
- What opportunities for biodiversity can be designed into new developments?

⁴ See for example, the MONARCH projects (Berry and others 2005), and work within the Environmental Change Institute, Oxford, as part of the BRANCH programme.

Biodiversity and climate change information needs

- Baseline data to assess the effectiveness of any measures proposed or implemented;
- Information on different adaptive capacities of wildlife species and habitats in a dynamic situation is needed;
- Good information about the relationships between size and connectivity of habitats of different kinds;
- Information on interdependence of sites within the wider landscape;
- Species' habitat needs and good practice in translocation.

A more detailed list of knowledge gaps, and knowledge transfer issues emerged from a meeting held on this topic at Aviemore (EPBRS 2005). It was also stated at workshops that much information is already available (although not always in the most useful form) and that what is needed is the reformulation of available data into more useable formats, making sure that it is available to the 'right' person. Checklists for climate change were mentioned in the workshops, though it was also argued that too many checklists already needed to be completed.

3.4 Summary and key findings

This review has shown that spatial planning in the three countries is in many ways still getting to grips with two aspects of biodiversity planning. There is increasing recognition of:

- 1 The dynamic approach to biodiversity (eg managed realignment), which goes beyond the static concept of protection of designated sites and emphasises the value of the wider landscape, including urban areas, and the opportunities for enhancement and creation through the spatial planning or development process. This process may have been in place in the Netherlands for longer than other countries.
2. The wider benefits of biodiversity and ecosystems for human health and well-being.

Issues and shortcomings in the field of planning identified during the policy review include: a need for leadership, absence of powers and implementation capacity, lack of policy guidance and the questions of time scales, boundaries and how to safeguard land for future needs, in addition to overlapping plans and initiatives and conflicts between policy sectors. There are gaps in knowledge - leading to a need for research not only into biodiversity issues (dispersal capacity, etc) but also to provide clarity of options for planning measures. Spatial planning skills shortages have also been mentioned.

The findings suggest that, while climate change adaptation is yet another new issue for spatial planning, and it may be too early to find much evidence of practice on the ground, this is a good moment to argue that integrating biodiversity adaptation into planning for climate change requires recognition of dynamic systems. The resulting better practice would then offer opportunities not only for biodiversity but also for other aspects of quality of life.

Section 4 which follows explores some of these issues through a number of examples and case-studies. Section 5 then examines the role of European policy and legal requirements for policy-integration, such as the tools for appraisal and assessment of projects and spatial plans.

Key findings

- Policy on climate change and biodiversity across the partner countries is at different stages of development and implementation, but all BRANCH partner countries recognise issues associated with sea level rise and the need to meet changing conditions in a dynamic way.
- Initiatives are being taken to reinforce or develop networks and to create habitats, as well as initiatives which enable planners to react via providing information baselines. Actions in connection with other environmental impacts will also often help biodiversity respond and thrive. These initiatives and actions address biodiversity needs at different levels, in terms of whole ecosystems, or protected sites or the wider landscape.
- Uncertainties and unclear messages, and the absence of a clear strategy on climate change have slowed the planning response. Research and awareness campaigns are now underway.
- A set of shortcomings have been identified in the process dealing with climate change, including gaps in guidance, on measures, non-availability of powers or funding and unresolved conflicts between policies.

4 Approaches to biodiversity conservation, and case studies

In this section we outline first a hierarchy of approaches to biodiversity protection and enhancement to address climate change. The hierarchy of approaches is in line with English Nature policy (see Annex 1) and with thinking in the Netherlands, expressed at the workshop in The Hague; it is provided as a conceptual tool but it is recognised that there is overlap between the categories. Then we present a set of case studies for designated biodiversity sites which illustrate the impacts of climate change, the pressures at the sites and current plans affecting the sites.

4.1 Approaches to biodiversity conservation and enhancement

4.1.1 Types of approach

A range of spatial planning approaches which facilitate responses by plant and animal species to the effects of climate change have been proposed or implemented; it is still early days to have evidence of the effectiveness of these measures. They involve enabling species to disperse from sites and habitats no longer suitable for them, or managing sites in ways appropriate to changed conditions, or improving the suitability of the environment for biodiversity. The measures are aimed at promoting resilience/robustness of sites and species to climate change impacts, or accommodating species' needs. The measures may also protect wildlife from other adverse impacts. The measures and actions stretch across the spatial planning levels:

Sites and habitats planning and management	Planning and management for individual habitats or habitat types, at both statutory designated sites and undesignated sites with potential for biodiversity enhancement.
Wider landscape planning	The wider landscape includes land outside designated sites, and may include arable fields and pasture but also semi-natural habitats such as hedgerows, as well as 'green infrastructure' in urban areas, including allotments, gardens and parks. Measures here include ecological networks, corridors and stepping stones, as well as the reduction of fragmentation and species isolation.
Ecosystem planning	Planning that takes into account fundamental natural processes, eg water infiltration and flooding, coastal processes, movement of species.

4.1.2 Site and habitats planning and management

A fundamental line of approach to building in flexibility for biodiversity to respond to climate change is via protection of sites: sites already designated for their biodiversity value, together with sites that have that potential for enhancement to provide suitable habitats for individual or diverse species. Site protection and management is important for safeguarding the existing reservoirs of species and maintaining habitats that can change and adapt as climate changes. Sites must be in good condition to enable them to withstand some degree of

environmental change. (Consideration should also be given to the wider environment, in which sites are located, see below 3.2.5.)

Appropriate measures include

- maintenance and enhancement of sites with biodiversity value (may include designated and non-designated sites);
- habitat creation as a condition of planning permission (eg reed beds, SuDS designed for biodiversity enhancement, promotion of green routes);
- identification and safeguarding of sites that would provide opportunities for species to move/migrate into new areas (eg areas of biodiversity opportunity called for in South East Plan (SEERA 2005));
- recognition of the role of brownfield sites as potential biodiversity sites, and of brownfield corridors in linking such sites, eg railway corridors, and management that is sympathetic to the needs of biodiversity enhancement;
- enabling resources to be provided for ongoing management of such sites (eg via developers' contributions). Legal agreements with developers, conditions on consents and policy and design guidance provided in forward plan documents can be used on a site by site basis or on a wider scale to increase the resilience (health and survival) of biodiversity. These are measures that can only be used when an opportunity arises. They are rarely strategic and targeted where most needed and so may not realise the full value (social, economic and environmental) which is possible.

Habitat re-creation (restoration) and habitat creation provide space for a healthy future biodiversity as climate changes. It provides protection, with buffer zones around reserves and designated sites; it promotes movement and exchange by increasing connection between sites and helps viability by enlarging habitats and their associated species populations. It also contributes to the conservation of genetic diversity within and among populations of native species.

The translocation of species with limited dispersal capacity to appropriate sites may also be considered (Hulme 2005). Experience of translocation is still rather weak and this is a controversial measure. Guidelines have been prepared by English Nature/JNCC on relocation of species threatened by development (McLean 2003).

Box 4.1 summarizes an RSPB study to map opportunities for habitat creation. It also identifies some of the range of multiple benefits which may be derived from improving conditions for biodiversity.

Box 4.1 Habitat creation - mapping opportunities and creating additional benefits

Work for the RSPB has identified areas suitable for habitat re-creation/creation in southern England RSPB (2004) by ‘opportunity mapping’. This involves identifying, on the basis of assessment of a range of physical and biological features, priority land with a study area, upon which key habitats can be re-created, and mapping these.

The study was carried out in southern England, (East Dorset, Purbeck and Christchurch - chosen for having an abundance of recognised important wildlife habitats as well as wide opportunities to re-create a range of UK BAP priority habitats.) and maps areas suitable for re-creation of selected habitat types. The habitat categories selected were taken from the JNCC’s list of 17 terrestrial and freshwater UK BAP Broad Habitat Types; and selected for two main criteria: a. Extent of minimum physical requirements and b. Relevance to the study area.

Benefits of habitat re-creation identified by the RSPB and others include the following socio-economic benefits:

- Attractive landscapes for access and leisure, contributing to quality of life and mental and physical well-being;
- Ecosystem services - this includes reduction of flooding risk by wetlands; reduction in investment costs for sea defences (saltmarsh) and carbon sequestration in peat bogs assisting in mitigation of climate change.
- Other benefits for local economies result from strengthening tourism appeal by increasing the natural beauty of an area. High quality environments attract and retain tourism and non-tourism businesses and their staff.
- Education opportunities newly created/restored habitats can become a long-term educational resource for communities and schools.

Creating and restoring habitats will also help in meeting other policy objectives and obligations, eg the requirements of the habitats, SEA and Water Framework Directives, as well as achieving targets under the Convention on Biological Diversity and Biodiversity Action Plans.

Opportunity mapping is an initial first step. Then the sites need to be safeguarded from inappropriate development and land use and also positively allocated for habitat re-creation in Local Development documents. LDDs should also set out the means by which these steps may be achieved.

source: RSPB 2005b

4.1.3 Wider landscape approach

The ‘wider landscape’ approach integrates biodiversity into other processes and activities in the landscape, including farming. In England, national PPS 9 recognises the role played by the wider environment in maintaining the biodiversity of designated sites and this recognition should be reflected in forward planning documents and individual development control decisions.

The approach at the wider landscape level aims to increase multi-functional, biodiversity-rich landscapes in a strategic and targeted way. Such landscapes can strengthen a wide range of functions – which benefit biodiversity but which also help in other ways, such as flood mitigation, as well as providing social and economic benefits (eg recreation opportunities). An approach targeted on particular landscapes or areas lends itself well to gaining

stakeholder support as landscape units often have a readily identifiable character. Measures include:

- Maintenance of environmental quality in undesignated areas, so that they remain ‘permeable’ to wildlife and avoiding changes which would leave undesignated tracts of land impoverished in terms of niches, habitat patches, etc.
- Raising awareness of the value of the wider countryside in enabling species to disperse.
- Partnership with other bodies (planning system may not have jurisdiction or adequate resources of funds or skills). Partnerships would consist of stakeholders responsible for different aspects of the environment (see Box 4.3).

EU agri-environmental measures were introduced following 2003 CAP reform; these include Entry Level and Higher Level Schemes in England, and BCAE schemes (Les bonnes conditions agricoles et environnementales) in France. Funding by this route supports specifically designed farming practices, going beyond the baseline level of ‘good farming practice’ that help to protect the environment and maintain the countryside. Commitments covered by national/regional agri-environmental schemes within the EU include environmentally favourable extensification of farming; the management of low-intensity pasture systems; the preservation of landscape and historical features such as hedgerows, ditches and woods; and the conservation of high-value habitats and their associated biodiversity.

Two approaches to biodiversity conservation in the wider landscape are given in the following boxes. Box 4.2 summarizes the Kent Lifescapes project, which identifies potential habitat creation and restoration sites via GIS-based opportunities mapping, in order to raise the capacity of the wider landscape for biodiversity. Box 4.3 describes a partnerships-based project now under development.

Box 4.2 Kent Landscape Information System

The Kent Landscape System (KLIS) is designed to assist farmers and land managers in decision-making and farm planning. It can also be used by those involved in land use planning to help forward planning for biodiversity and identify opportunities for landscape restoration. K-LIS is an Internet-based Geographical Information System, giving access to spatial information about the countryside and biodiversity of Kent, as well as delivering advice on the targeting of wildlife habitat recreation and restoration at the local and strategic level. The system brings together a set of ‘layers’ within a GIS, covering: physical geography, designated sites, biodiversity, habitat capabilities and opportunities, land cover, landscape character, etc. Maps can be produced electronically showing, for any selected area, the desired set of attributes (eg access, opportunities for enhancement).

KLIS helps target resources to deliver BAP priorities and provides options/scenarios to aid in land management decisions. It can be used to inform the community strategies and development plan process, as well as co-ordinating land management advisory networks and the strategic biodiversity policy and review of Kent BAP. The system is also used to help target the county’s own resources through advisory networks. Maps generated using the system can be saved, modified and printed.

See: <http://extranet7.kent.gov.uk/klis/home.htm>

Box 4.3 Local Land Management Frameworks (LLMFs)

LLMFs are a new proposal for spatial frameworks which will synthesize the work of existing strategies to promote sustainable development and ensure that land management policy delivers identifiable benefits and engages with local people.

LLMFs are intended to guide the delivery of land management (LM) within an area of common character, to maximise benefits for the environment, economy and community. Key stakeholders will reach consensus on the most appropriate form of land management in a given locality, focussing on influencing major LM decisions (delivery and policy development). Outputs of an LLMF are agreement of stakeholders on LM aspirations, identifying locations for these aspirations (to reflect local needs and character); priorities for LM where choices must be made, and opportunities for maximising benefits. Outputs will be mapped spatially and take account of topics including water resources, timber and public access. The LLMFs will be complementary to Community Strategies, Area Visions and Local Area Action Plans.

Formal piloting of these LLMFs will commence in late 2006 with pre-pilots being undertaken in NW Devon/NE Cornwall and in Hampshire. The project will be managed by *Natural England*.

Source: unpublished document, English Nature

4.1.4 Ecosystem planning

Ecosystem planning takes whole ecosystems or catchments as its base, and deals with managing land and water resources, restoring ecosystems and managing disturbance and cumulative effects, working with the range of agencies.

The Limburg robust corridor described in the case study section (Section 4.2.2) may be seen as ecosystem planning - working with a wide area and planning for biodiversity in a way that takes into account the needs of ecological functions, biodiversity and people. River basin management planning, under the Water Framework Directive (see section 5.2.3), also falls into this category. Another example is demonstrated by the ECONet project - see Box 4.4.

Box 4.4 ECONET (UK/Italy)

The European funded Life ECONet Project is exploring with local people in Cheshire, Abruzzo and Emilia-Romagna the best ways of creating networks connecting areas for wildlife, and demonstrating how it is possible to use these networks to make land use planning and management more sustainable. The project will use the latest GIS, digital aerial photography and landscape ecology to analyse the landscapes of the three locations. It will identify concentrations of habitats of high value for wildlife as well as areas which have the potential for the creation of new habitats and corridors for the movement of wildlife.

Extensive discussions will be held with all stakeholders to raise awareness of the concept of ecological networks, and to seek their support and active participation. The realisation of the networks and their integration into policy will only be possible with political and public support and co-operation.

The network will be pieced together in a number of ways. Parts are already in place, for example, as nature reserves and country parks. Elsewhere, the network will be incorporated wherever possible in existing rural and urban initiatives, and by utilising whatever grant schemes are available. Opportunities for the creation of new habitats by 'green generators', such as quarries, derelict land and landfill sites, will also be explored.

sources: www.lifeeconet.com/ and www.cheshire.gov.uk/SREP/NHE_Econet_EcoToolkit.htm

4.2 Case studies

4.2.1 Introduction

This section presents information on a set of case studies of designated sites taken from NW Europe. The case studies are designed to show:

- the impacts of climate change at different inland and coastal sites;
- the range of pressures experienced at the sites;
- adjacency of other wildlife sites, and eco-barriers;
- the nature of planning provision and biodiversity protection already in place;
- measures to help biodiversity resilience.

It is not feasible to evaluate detailed proposals - given the space and time available - for the measures that might be appropriate for these sites, but they are offered as a possible basis for discussion, and also because these sites are part of the wider BRANCH programme: other research work is in progress at the sites.

The case studies are:

- 4.2.2 Bay des Veys, Basse Normandie, France
- 4.2.3 Limburg robust corridor, Limburg province, Netherlands
- 4.2.4 Keyhaven to Lymington Marshes, Hampshire, England
- 4.2.5 Stodmarsh, Kent, England
- 4.2.6 Queenborough and Rushenden, Kent, England

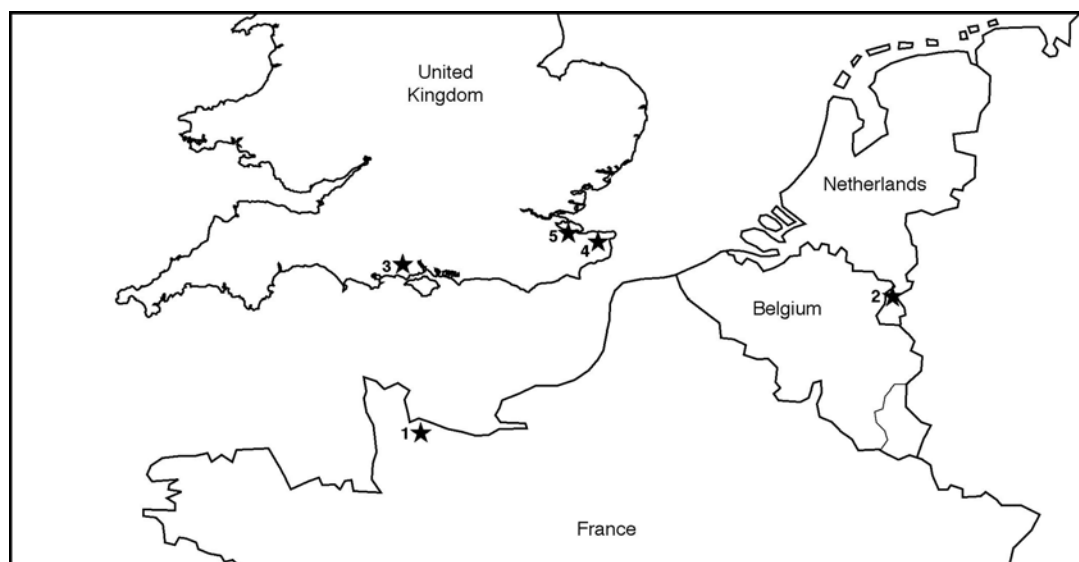


Figure 4.1 Location of case study sites

Key:

- 1 Bay des Veys, Basse Normandie, France
- 2 Limburg Robust Corridor, Limburg province, Netherlands
- 3 Keyhaven to Lymington Marshes LNR, Hampshire, England
- 4 Stodmarsh NNR, Kent, England
- 5 Queenborough and Rushenden, Kent, England

4.2.2 Bay des Veys, Basse Normandie, France

The site and its value

The Bay des Veys, at the south eastern end of the Cotentin peninsula, has a diverse landscape with arable (cereal) fields, pastures and hedges as well as peat bog, drained marshes (cultivated and uncultivated), rivers, dune-belt, saltmarsh, silt flats and beach. Land has been gradually won from the sea since around AD 1000 and until 1972. Coastal defences within the Bay are no longer being maintained and the sea is encroaching. Cotentin-Bessin Marshes National Park surrounds the Bay.



Location

<http://www.conservatoire-du-littoral.fr/front/process/Content.asp?rub=8&rubec=233>



Saltmarsh

Designations and conservation objectives

The habitats of the Bay are of international importance and have been given Natura 2000 status (FR 2500088). Conservation objectives for the area are: the maintenance of activities and conservation of the birds, the harbour seals *Phoca vitulina* and the saltmarsh and its vegetation. The bay regularly holds large populations of migrating water birds (ducks, waders) either temporarily or through the winter. Large numbers of birds (<20,000) and an array of bird species use the site, including birds of international and national importance. Other valued species are: great crested newts *Triturus cristatus*, bats *Myotis myotis*, southern damselflies *Coenagrion mercuriale*, and stag beetles *Dorcas spp.* The flora of the Bay includes fritillaries including *Euphydryas urinia*, rare orchids and ferns.

Other land uses and management

Management of the site consists of farming and water level management (rivers). The Bay is an important cultivation site for both oysters and mussels - 190 ha of oyster beds produce 7000 tonnes per year; cages produce 600 tonnes of mussels per year. Marine polychaete worms (*Lanice spp.*) are present in the oyster beds. There is some wildfowling over the site.

Key management issues for the wider site (Cotentin-Bessin Marshes and the Bay) are the maintenance of the arable fields and pastures and the maintenance of water levels, as well as

the ecological management of the sensitive sites. There are no specific proposals for development affecting the Bay at present⁵.

Adjacent habitat and barriers

Four rivers drain from the Cotentin-Bessin Marshes National Park into the Bay⁶. This 145,000 ha Park was established in 1991 and comprises hedged farmland, wetlands (21% of area) and some pine forest on sandstone. A physical barrier – floating gates - exists between the watercourses and the sea, marking the boundary between fresh and salt water; the gates prevent the sea from entering the interior marshes at high tide.

Expected impacts of climate change at the site

A study of climate change impacts upon the sites owned by the Conservatoire du Littoral has identified the Bay des Veys as one of the Normandy sites particularly vulnerable to sea level rise and coastal flooding (Clus-Auby and others 2005⁷). Increased frequency and severity of storms is also seen as a source of damage. This might lead to an impact upon the dykes, which may be vulnerable. Other than this the saltmarshes are protected from the sea by the floating gates.

Scenarios currently predicted for sea level rise (30-40 cm) do not seem to threaten the continuing existence of these gates⁸ nor do they indicate a change in the freshwater status of the marshes. On the other hand, the drainage of freshwater may become more difficult during short periods, resulting in water level rise within the marsh with prolonged flooding and less attractive conditions for farming.

Existing plans/procedures affecting the site

A number of plans relate to the Bay. These plans (SCoT – Plan for Spatial Cohesion, SRADT – Regional Planning and Development Strategy, and SAGE - Strategy for planning and management of water bodies) must work in compliance with the DTA (Spatial Planning Strategy) for the region. Basse Normandie is included within the DTA for the Seine Estuary⁹. All of these plans and strategies, including the DTA for the Seine Estuary, are currently being developed and have not yet been finalized.

Flexibility of existing plans for ‘adaptive management’

There is no current overall site plan, other than the Natura 2000 documentation, and this does not refer to climate change. No long term creation or enhancement sites for biodiversity have been identified within the Bay, but the previously defended (‘polder’) area could fit this purpose, topography permitting and if farming issues can be managed.

⁵ See http://www.eurosite-nature.org/article.php3?id_article=312

⁶ see www.parc-cotentin-bessin.fr

⁷ Clus-Auby, C.; Paskoff, R. and Verger, F. (2005) *Chaud et froid sur le littoral* Paris: Conservatoire du Littoral

⁸ Commentary from JB Wetton, at National Park office

⁹ see http://www.ccsr-basse-normandie.fr/publications/20808_1DTA.pdf

Climate change is not mentioned in a 2005 publication from the Regional Council¹⁰ on future socio-economic and demographic prospects for the region.

Issues:

Sea level rise, changes in planning process, conflicts between farming and wildlife uses, potential for adaptive management to increase habitats

Measures to help biodiversity resilience

Climate-proofing of a management plan for the Natura 2000 site and adjacent National Park and consideration of climate-proofing of an ICZM plan.

Sites: Further land acquisition and management agreements to create compensatory marshland habitats.

Wider landscape: Integration of climate change adaptation into regional plans via Appropriate Assessment or SEA; promoting networks and links into Park area and beyond, raising quality of surrounding landscape for biodiversity via agri-environment measures.

Ecosystem approach: river basin management plan for Cotentin-Bessin catchment area.

4.2.3 Limburg Robust Corridor (Schinveld to Mook), Netherlands

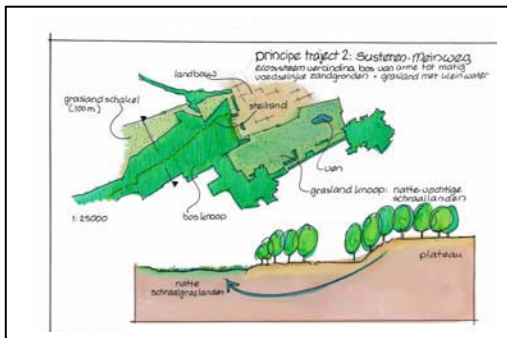
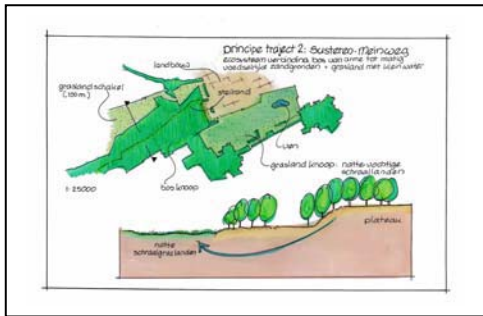
The site and its value

The Limburg ‘robust corridor’ links a chain of habitats in southern Netherlands, on the eastern bank of the Maas/Meuse River close to the German border. The corridor contains hills and valleys with dry and wet forests, heathland, poor and rich pastures, hedges, arable fields and marshy valley grassland in the valleys. Flora and fauna (including deer, butterflies and reptiles) some unique to the Netherlands and beyond, are found in the corridor. Urban and rural settlements, roads and railways lines are also located in the corridor.

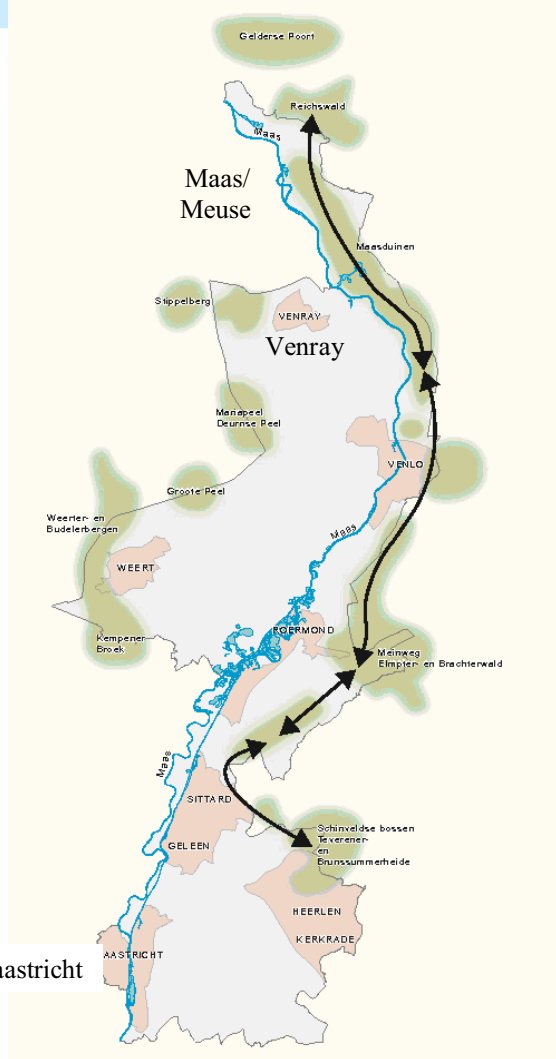
¹⁰ Regional Council for Basse Normandie, and INSEE (2005) *Cent pour cent Basse Normandie* Demographic, economic and social panorama of the region, and part of the SRADT process.

Legenda

- Nature core area ■ Natuurkerngebieden
- Urban area ■ NEN
- Water



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 Top: onbegroot © Topografische Dienst Kadaster © Euroverse Beeld
 geo0167_000227_Robustecologischeverbinding



A significant proportion of the Limburg corridor has Natura 2000 status. The conservation objectives for the total site aim to improve the spatial coherence of the Netherlands Ecological Network (NEN) to rehabilitate and safeguard biodiversity. The robust corridor is also designed to improve or establish connections between units of national and international biodiversity interests. Increased biodiversity resilience, via increasing the size of habitats and consequently the likely survival of vulnerable species, is a further aim. Each individual unit has specified conservation objectives.

Adjacent habitat and barriers

There are 870 ha of land (mainly agricultural) allocated as corridor in adjacent German border areas. Barriers to wildlife within the corridor include the transport infrastructure – and the forthcoming reactivation of the Iron-Rhine railway. The provincial Environment and Spatial Plan allocates space to extend agricultural uses (including glasshouses and livestock farms) quite near areas which are planned as part of the robust corridor.

Barriers to international migration (for deer) include fences and limited financial resources for network development on the German side.

Expected impacts of climate change at the site

Climate change is given as one of the reasons why biodiversity targets set within the context of the National Ecological Network may not be achieved: climate change is seen as a non-predictable risk. The overall success of the National Ecological Network will also determine whether the biodiversity targets will be achieved. The spatial interconnection between units of the NEN is too weak at several locations to realise the biodiversity targets set at national or international level, and connections into wider networks are recognised to be weak.

Plans affecting the corridor

A number of plans are in the process of being developed or implemented and will influence the development of the Limburg corridor. Future decision-making related to the implementation of the robust corridor depends on the availability of funds and the release of areas. National policy (as expressed in *Nota Ruimte*, Ministerraad 2004) determines the assessments of the different elements of the robust corridor (to be carried out by LNV¹¹). Limburg Provincial Council agreed a reconstruction plan in 2004 setting corridor boundaries. The corridor has been reviewed within the province's Environment Plan for Limburg, and further action is planned to finalize the corridor.

Specific proposals for development/change

Establishment of the Limburg robust corridor is in its initial stages, with consultation of various stakeholders and interest groups, and the development of policy. Final explicit decisions (eg on acquisition and funding) have yet to be made. Eventually the corridor should consist of approx. 1975 ha of land, of which ~35% will be under stewardship agreements. The operational target for 2004-07 is 685 ha, with 54% acquired land.

Issues

Fragmentation of landscapes, links to adjacent habitat, international links, funding, development pressures

Measures to help biodiversity resilience

Climate-proofing of SEA of plan for the corridor and of management sites along corridor.
Sites: Further land acquisition and management agreements to create and restore suitable habitats

Wider landscape: Integration of climate change adaptation into regional plans via Appropriate Assessment or SEA; enhancement of adjacent agricultural land for biodiversity via agri-environment measures.

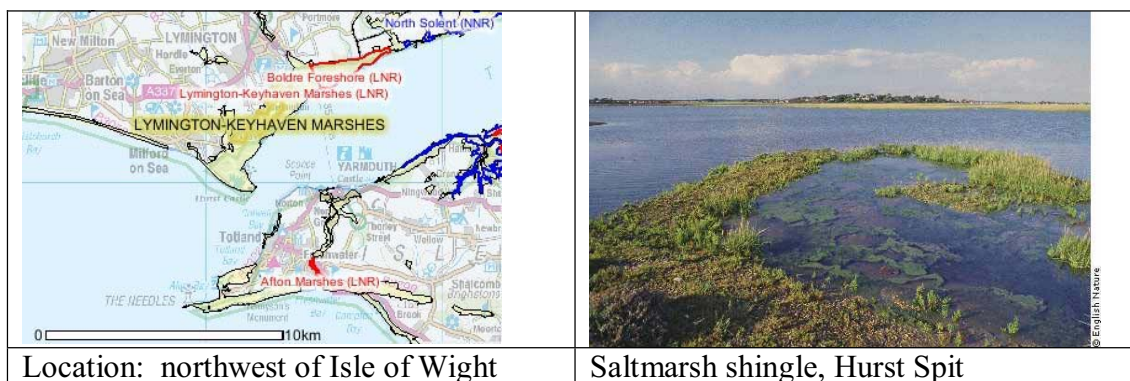
Ecosystem approach: River basin management plan for Maas-Meuse catchment area.

¹¹ LNV: Netherlands Ministry for Agriculture, Nature and Food Quality.

4.2.4 Keyhaven to Lyminster Local Nature Reserve, Hampshire, England

The site and its value

This 194 ha Local Nature Reserve (LNR), is located in a low-lying, flood-prone stretch of the south coast with a variety of overlapping national and international designations for nature conservation and landscape quality. It contains a range of coastal habitats which have limited distribution, these include inter-tidal mud, *Spartina anglica* marshes, high-level mixed saltmarsh and a naturally formed botanically-rich 2.5 km shingle spit protecting the whole Western Solent. Together with a sea wall the spit also protects an area of both fresh and brackish marshland. The *Spartina* marsh increased in area up to the 1920s, but has been declining since then, dying back for reasons probably including increased wave attack, higher water levels and lack of sediment. The marshes are backed by a seawall built in the early 1990s which will prevent them from retreating inland as the water level rises ('coastal squeeze').



Wildlife: The saltmarshes, mudflats and shingle ridges support nationally and internationally important numbers of birds, such as black-headed gull, *Larus ridibundus*, several species of tern and breeding waders: oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula* and redshank *Tringa totanus*. The marsh lagoons lying inside the seawalls form a nationally important habitat for a number of uncommon salt and brackish water invertebrates (notably: starlet sea-anemone *Nematostella vectensis* and sand shrimp *Gammarus insensibilis*). The reserve flora is also of great importance: much of the intertidal area is dominated by common cord-grass *Spartina anglica*, glassworts *Salicornia* spp, sea-purslane *Atriplex portulacoides*, sea aster *Aster tripolium* and golden-samphire *Chrithum maritimum*.



Adjacent habitats: Important adjacent sites and habitats are those of the wider New Forest National Park and SSSI. Nearby sites include a National Nature Reserve, European and international importance to nature conservation and several Local Nature Reserves. Much of the Solent and part of Southampton Water have been included in a candidate SAC.

Other land uses

A number of shellfish species flourish offshore, including one of the most important native oyster fisheries in northern Europe. Over 30 commercially viable fish species are taken from in-shore waters.

The spit has a scheduled ancient monument (Hurst Castle). It is a very popular destination for visitors. A small fishing fleet operates from Lymington; other traditional uses of the intertidal areas include wildfowling, non-commercial bait digging and the collection of gulls' eggs – these are permitted under a series of licences and leases.

The saltmarsh is receding at a rate of about 6 metres per year, mainly as a result of sea level rise - an estimated 6 mm per year along this coast. The lack of fine sediments and boat wash are contributing factors. Coastal defences constructed further west over the last 50 years are believed to have substantially reduced the natural shingle supply to Hurst Spit in the littoral drift, and caused the spit to lose volume. Breaching now occurs every winter under storm wave attack, and the spit is now fortified and replenished artificially with material dredged from another Solent bay.

Other issues have been highlighted as potentially contributing to pressure on the site: water quality (marine oil, discharge from a major sewage works and a local outfall), water level issues as a consequence of gravel extraction in the immediate hinterland of the site and recreation. The area is a favoured destination – with over 4000 visitors daily in summer - and recreation activities include sailing, windsurfing and other water sports, walking, bird watching and fishing. The Spit is popular as a beach, but has dangerous tidal currents. There is a limited amount of trespass with dogs into sensitive areas, rabbit coursing, unauthorised peat digging, water-skiing in inter-tidal creeks, and jet-skiing in sensitive nearshore areas.

Other potential threats to the local wildlife are predation upon ground nesting birds (including little terns), whilst invading vegetation growth is a problem on islands used for nesting by terns. Measures are in place to manage lagoon salinity, predation and invasive vegetation.

Plans

The reserve is affected by a number of plans and strategies:

Area wide

- New Forest District Local Plan 2005 (which includes the whole of this area in the Green Belt, with severe restrictions on development).
- From April 2006, the New Forest will be the responsibility of a National Park Authority and a statutory management plan will be prepared; this site falls within the Park.
- Coastal and flood management.
- Shoreline Management Plan (Hurst Spit to Hamble River - lead authority: New Forest District Council).
- Western Solent Coastal Defence Strategy Study.
- New Forest District Coastal Management Plan.

- Solent Coast and Estuaries Coastal Habitat Management Plan (ChaMP).

Biodiversity and nature conservation

- Hampshire Coast Biodiversity Action Plan.
- Solent European Marine Sites Management Plan.
- Local Nature Reserve Management Plan

Relevant issues from the plans

The New Forest District Coastal Management Plan (2004) states it will:

‘B3i Give priority to protecting sites of nature conservation value around the District’s coastline from pressures that would adversely affect their nature conservation interest. In the event of conflict between nature conservation and other interests, nature conservation will normally prevail’.

Other objectives of the Coastal Management Plan include increasing enjoyment and recreational use of the coast, and to recognise and maintain the economic and social functions of the coast, working with local stakeholders.

The preferred defence options for this zone in the Shoreline Management Plan are to ‘Hold the Existing Line’ along some stretches – though it is recognised that this may not continue to be sustainable, and ‘Do nothing’ (except occasional dredging) elsewhere. The Lymington-Keyhaven seawall (rebuilt following damage by severe winter storms in 1989/90) would be inadequate to withstand direct wave attack – the marshes are an essential first line of defence.

Issues

Coastal erosion, saltmarsh erosion, multiple pressures and cumulative effects, multiple plans, management options, knowledge gaps, conflicting policy aims, coastal squeeze

Measures to help biodiversity resilience

Climate-proofing of statutory Plans for the area, including National Park plan and climate-proofing any ICZM plan.

Sites: Further land acquisition and management agreements to create and restore suitable habitats.

Wider landscape: Integration of climate change adaptation into local and regional plans via Appropriate Assessment or SEA; developing networks.

Ecosystem approach: River basin management plan for local catchment area.

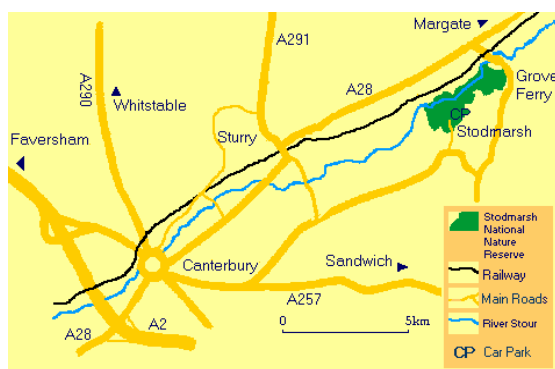
4.2.5 Stodmarsh National Nature Reserve, Kent, England

The site and its value

Stodmarsh is a 241 ha. wetland site formed from subsidence under the valley of the Great Stour as a result of coal-mining. The range of wetland habitats include open water, extensive reedbeds, grazing marsh and alder *Alnus glutinosa* carr. The NNR is included in the Stodmarsh Special Protection Area (SPA) and is the home of almost all of the SPA's waterfowl interest. Stodmarsh also has cSAC and Ramsar designations.

The reserve contributes particularly to the qualifying features of nationally important winter populations of the Annex I species bittern *Botaurus stellaris* and hen harrier *Circus cyaneus* (winter roost); management of the extensive reed bed habitats are the priority for these two species. The reedbed also supports nationally important breeding and winter populations of bearded reedling *Panurus biarmicus*. The open water is important for the nationally important winter populations of migratory gadwall *Anas strepera* and shovelers *Anas* spp.

Other wildlife at Stodmarsh includes nationally rare invertebrates, such as the shining ram's-horn snail, and a range of moths. A number of rare plants are also found here such as the carnivorous greater bladderwort and greater spearwort. The value of the 28 ha of shallow lagoons is enhanced by the grazing marsh habitats close by.



Location



Grazing marsh



Reedbed habitat at Stodmarsh

Other land uses and management

Some 37 ha of the reserve marsh are used for cattle grazing in summer, provide suitable conditions for winter birds. The reedbeds are closely managed by regular cutting in order to maintain the reedbed habitat and prevent succession. Water flow through the habitats is closely managed through sluices and dykes to maintain the quality of the habitats.

Recreation activities at Stodmarsh include wildfowling, fishing and bird-watching. Potential threats to birds include residential development adjacent to the site, recreational disturbance, problems of water quantity and quality, groundwater abstraction and reservoir development. The reserve is provided with visitor facilities.

Expected impacts of climate change at the site

There have been numerous sightings of uncommon birds at Stodmarsh in recent years. Low flows are already a problem in rivers in this area - any decrease in water levels could affect the habitats; hotter drier summers, increasing evapotranspiration would contribute to this, and would also potentially increase water demand locally (already rising because of increased numbers of summer visitors, garden sprinkling and golf course irrigation). Rising sea levels and storm surge may lead to salt water incursion into the marshes.

The Kent BAP cites water level management and water availability and coastal processes as key factors affecting the habitat, both of which are influenced by climate change. The Stour CFMP (see below) points to flood risk as a result of climate change as a risk factor for the site: the breaching of the flood bund may affect water quality and give rise to other flooding issues at the protected site. A tidal barrier has been proposed for the River Stour, which will help protect the area.

Plans

- Stour Catchment Abstraction Management Plan - controlling abstraction from the Stour and the chalk aquifer.
- Stour Water Level Management Plan and Catchment Flood Management Plan - controlling water levels for wildlife and reedbed cutting.
- Kent and Medway Structure Plan and Canterbury District Local Development Framework (in preparation).
- Kent Biodiversity Action Plan - The BAP acknowledges coastal processes and the threatened loss of reedbed habitat due to predicted sea level rise.
- Stodmarsh NNR Management Plan (English Nature 1993).
- Draft regional plan (South East Plan) - refers to this as an area of opportunity for biodiversity improvement.

There are proposals for further significant expansion of Ashford, located upstream. It is anticipated that the increased water supply demand would be met in part from the chalk aquifer and this may have impacts on river flows. More wastewater and run-off would be generated - these impacts could affect quality and quantity of local rivers flowing into Stodmarsh.

Issues:

Sea level rise and coastal erosion; flood risk, water quality and multiple pressures.

Measures to help biodiversity resilience

Climate-proofing: of statutory plans for the area.

Sites: Further land acquisition and management agreements to create, restore and link suitable habitats.

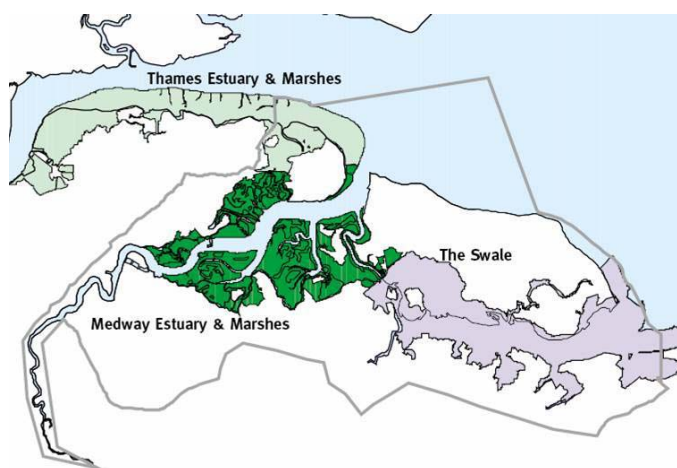
Wider landscape: Integration of climate change adaptation into regional plans via Appropriate Assessment or SEA; developing networks.

Ecosystem approach: River basin management plan for Stour catchment; SuDS development in Ashford and other settlements.

4.2.6 Queenborough and Rushenden, Kent, England

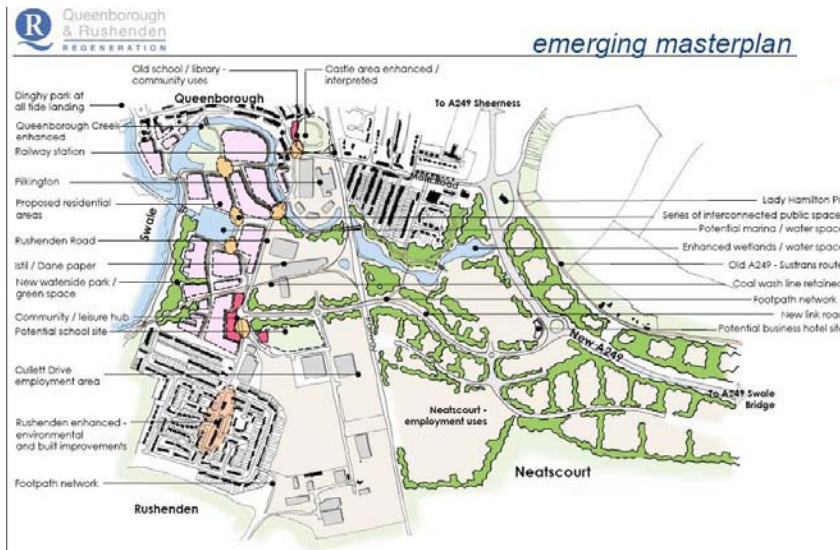
The site and its value

Queenborough was once an important coastal and fishing town which has experienced decline in the C20. Located on the Isle of Sheppey, it lies between three SPAs: Medway Estuary and Marshes, Thames Estuary and Marshes and the Swale SPA, covering 13408 has. The habitats include saltmarsh, inter-tidal muds and freshwater grazing flats. The mud-flats are rich in invertebrates and also support beds of *Enteromorpha* and some Eelgrass *Zostera* spp. The complex and diverse mixes of coastal habitats support important numbers of waterbirds throughout the year. In summer, the estuary supports breeding waders and terns, whilst in winter it holds important numbers of geese, ducks, grebes and waders. The site is also of importance during spring and autumn migration periods, especially for waders.



Source: Swale Estuary Partnership

With Rushenden, Queenborough is the subject of a major regeneration scheme by the South East Economic Development Agency, SEEDA. The plans include residential, mixed use, employment land, community facilities and open space and a marina.



Source: Rummy Associates; Acknowledgments: SEEDA, LUC, CAG Consultants & Gardiner & Theobald

Other land uses and management

The land falls within the Greater Thames Estuary Coastal Natural Area, which is not a formal designation, but an area based on a combination of wildlife, land use and culture. It also lies within the North Kent Marshes Special Landscape Area designated in the Kent County Council Structure Plan.

Expected impacts of climate change at the site

The key general issues for the site include scarce water resources; flood risk from sea-level rise and storm surges, fluvial and ground-water, overland and drainage systems flooding; direct and indirect impacts on biodiversity and people; increase in temperatures leading to thermal discomfort in employment or residential property; effects on green spaces and the public realm; impacts on historic structures (such as wharves) and new and existing infrastructure (such as bridges and the marina).

The general issues for biodiversity relate to the role of the salt marshes, mudflats and grazing marsh for birds. Specific issues include the impacts of possible saline intrusion on habitats, and the effects of drier seasons on groundwater flows into the marshes; coastal squeeze on the saltmarsh; the possibility of inland shift of habitats via creeks; the complex impacts of erosion and accretion and sediment levels; and the function and extent of the mudflats in protecting the marshes.

Plans

The Swale Borough Local Plan Re-Deposit Draft of 2005 includes an Area Action Plan and policies for the site: a Development Framework setting out a vision and design principles for the regeneration of the area was adopted in 2004. The regeneration is being led by SEEDA with the local authorities, and with other technical specialists. The Master Plan has evolved from these guidelines and is out for consultation 2005/6, and an Environmental Impact Assessment is being undertaken.

Measures to help biodiversity resilience

The Queenborough and Rushenden regeneration scheme has been a pilot study for a DEFRA and Three Regions Climate Change partnership funded study on adapting to climate change in the growth areas in south east England. The emerging master plan is already based on a vision of highlighting the wider landscape qualities of the area, especially the visual, water space and ecological assets of the Isle of Sheppey, and incorporating green and blue infrastructure in the design.. For biodiversity, the scheme plans to expand areas for land and water conservation. The plan aims to allow natural processes to continue. Revised flood risk modelling suggests flooding might occur in the southern part of the site but would not reach the residential areas. There would be minimal barriers to water and habitat movements, with a network of permeable ecological spaces, corridors and links; and a water management scheme maintaining the balance of evaporation and evapo-transpiration from the undeveloped marshes. Current suggestions include linking private and public greenspaces to the existing habitats; incorporating creeks (without sluices) into the site; and phased land-uses (such as public open space being converted into meadow after c. 20 years, and perhaps ultimately into marshy flood-storage). The importance of sensitive land and water management is also being emphasised.

The UKCIP Decision-making tool for risk and uncertainty (see Section 6) is being applied to the master-plan to clarify the objectives for the development; to establish the exposure of the development and its vulnerability to climate change risks; the attitudes to risk of the key stakeholders; and the criteria for appraising options

4.3 Summary and key findings

Biodiversity protection and enhancement measures may take a range of forms, concentrating on individual designated sites, or linking up networks or looking more broadly at how the wider landscape may contribute to promoting the survival of biodiversity. Ecosystem planning takes into account not only sites and their functions but also the needs of the environment as a whole and people within that environment. A number of approaches to maintain and improving opportunity for wildlife, notwithstanding climate change, have been described.

A set of case studies provide some illustrative material on the range of pressures now anticipated for coastal, wetland, rural and urban and sites as a result of climate change. The issues arising at these sites which are of relevance to the current study include the following:

Coastal sites:

- Sea level rise leading to: coastal erosion, ‘coastal squeeze’ between rising seas and flood defences, coastal flooding.
- Many existing plans and policies, some mutually conflicting, as a result of multiple pressures on the coast, including tourism and recreation.
- Poor integration of objectives, initiatives and policies.

Terrestrial sites:

- Fragmentation of landscapes but also potential links to adjacent habitats - sometimes across borders.
- Development and other pressures with conflicting policy aims.
- Funding issues for biodiversity enhancement.
- Interaction between biodiversity planning and water and flood policies.
- The need for integration of various planning initiatives and policies.

A number of measures that may be useful in addressing climate change at the various sites have been indicated. Some of these measures relate to protection of sites and habitats, to links across a surrounding landscape that is more 'wildlife-friendly', and also to measures to promote or restore natural ecosystem functions. Other measures concern the climate-proofing of statutory and non-statutory management plans and other plans such as ICZM plans that cover the sites. This will mean review the plans in the light of expected climate change impacts and incorporating impact mitigation measures and perhaps compensatory measures for any losses.

5 European (EU) strategies and approaches to planning for biodiversity and climate change

Ten aspects of EU policy work are introduced here: strategies and directives with direct importance for the environment and its protection and for spatial planning. It is apparent that almost all EU work leads to indirect impacts upon the environment (eg agriculture policy, industrial policy and transport policy), but it is not feasible to cover such a broad field. We concentrate here upon those aspects of policy that can be used to support action to protect biodiversity under a changing climate.

5.1 European spatial strategies

5.1.1 European Spatial Development Perspective (ESDP)

The ESDP (CEC 1999) was developed to provide coherence and complementarity between the spatial development strategies of the Member States as well as addressing spatial planning aspects of EU policies. It provides a vision for the future territory of the EU. It is intended as a frame of reference for spatially effective measures and provides public and private decision-makers with a basis for policies and actions. It promotes the integration of different territorial structures and requirements of the EU into spatial policies as well as the co-ordination of different administrations - according to their respective competences - without impairing the diversity of the European territory.

The three objectives of the ESDP are: to promote a spatial dimension in Community and national policies; to improve knowledge and research on spatial development (eg via Interreg III); and to prepare for the enlargement of the European Union. Amongst other aims, the twelve-point ESDP action programme

- promotes a vision of polycentric and balanced spatial development;
- promotes competitive cities;
- acknowledges the need for ‘wise management’ of natural heritage; and
- acknowledges water resources as a special challenge.

The ESDP has had an influence on the structure and framing of regional and spatial planning in Europe. It currently fails to recognise climate change adaptation issues, whilst at the same time the EU Climate Change Programme (see Section 5.3 below) currently fails to recognise the ESDP. There are at present no plans within the Commission to review or update the ESDP. See section 5.5 on subsidiarity and the ESDP.

5.1.2 Thematic Strategy on the Urban Environment

The EU Thematic Strategy on the Urban Environment (CEC 2006b) fulfils one of the commitments in the 6th Environmental Action Plan. It is aimed at helping regional and local authorities through providing guidance on integrated environmental management and sustainable transport plans, capacity-building and training and sharing of best practice and information. It points out that cities, as important economic drivers and containing 80% of Europe’s population, have a key role in implementing the Lisbon agenda. The Thematic

Strategy argues that any solution to the environmental problems of urban areas needs to be forward-looking, and anticipate the impacts of climate change. It mentions the links of urban environmental management with policy areas such as climate change, nature and biodiversity, sustainable urban design (land-use planning), the loss of natural habitats and impacts such as soil-sealing, and the promotion of urban biodiversity, although it does not expressly mention the role of spatial planning in assisting biodiversity to adapt to climate change. Note that this Thematic Strategy does not make reference to the ESDP.

5.2 Environmental directives

The EU directives most relevant to this project (Birds and Habitats Directives, SEA Directive, EIA Directive, and the Water Framework Directive) are outlined in greater detail in Annex 2. The potential role of these directives with respect to biodiversity and climate change is discussed here. The EU Biodiversity Strategy is another key environmental policy (see Section 5.4).

It is acknowledged by the European Environment Agency draft publication *Vulnerability and adaptation to climate change* (EEA 2005b) that climate change considerations have not yet been integrated ‘to any great extent’ into the key EU environmental policies. Nor has climate change been integrated into other EU policy areas which have a significant impact upon biodiversity, such as the reformed Common Agricultural Policy (CAP).

5.2.1 Birds and Habitats Directives

These directives support the creation of the Natura 2000 network, composed of SPAs and SACs and oblige Member States to protect and maintain these sites and prevent their deterioration. The Habitats Directive also recognises the value of ‘stepping stones’ for biodiversity (Article 10).

Issues raised by participants at BRANCH workshops include:

- Potential conflict between the requirements of the Habitats Directive and changing site characteristics and objectives, for example, where the species that are the principal conservation objective of the site have moved northwards in line with climate change, perhaps into another country.
- Issues over changing site boundaries as coastlines and rivers change.
- Sustainability tests of mitigation and compensation.
- The strength of Article 10.

These issues may be seen as challenges to the adequacy of the Habitats Directive in the light of changing biodiversity. Certainly it is believed that there is a need to amend the directive in the light of a recognised need to respond flexibly to changing environments and biodiversity, so that the aims of the directive continue to be met.

5.2.2 SEA Directive

As is the case with the other EU directives outlined in Annex 3, climate change is not an impact considered in the formation of the directive or its wording. However, the SEA has been identified in international agreements relating to biodiversity (the Convention on

Biological Diversity (CBD), the Ramsar Convention on Wetlands and the Convention on Migratory Species) and is seen as an important tool for ensuring that conservation and sustainable use of biodiversity are pursued as fundamental objectives of strategic decision-making and planning. Treweek and others (2005) have discussed how SEA can help to promote the conservation and sustainable use of biodiversity, such as providing opportunities to ensure that proposed plans are consistent with policies and priority actions for biodiversity conservation, protection and sustainable use. This may include for instance, obligations under global conventions as well as any national policies for biodiversity or environmental protection. Guidance is available on SEA and climate change (Levett-Therivel, and others 2004). As areas outside protected sites are also important for the conservation of protected species, SEA can be used to make planners and decision-makers aware of areas without formal protection, which nevertheless make a significant contribution to the habitat requirements of protected species, or which link such habitats. SEA may also provide opportunities to consolidate and implement biodiversity initiatives pursued by local stakeholders, NGOs and other partnerships.

If climate change impact assessment becomes a standard element in the SEA process, then these benefits could be gained and directed towards adaptation for climate change. This means that the impact of the plan or programme must be assessed against a changing climatic context, over time, taking into account the proposed mitigation (to reduce plan impacts). The likely effectiveness of compensatory measures must also be assessed in the light of climate change.

5.2.3 Water Framework Directive

The key objectives of the WFD are achieving, by set deadlines, ‘good status’ for all waters (except those determined to be heavily modified water bodies; some aspects of SuDS systems may fall into this category). This is to be achieved through the implementation of river basin management plans. The directive makes no reference to climate change, but this change will affect how ‘good status’ may be defined for a water body and will bring changes in physical conditions (temperature, chemistry, flows) as well as leading to impacts such as invasions by non-native species. The Environment Agency for England and Wales notes in a position statement on the WFD (EA 2003) that the series of planning cycles required under the directive will enable long term trends to be taken into account, and specifically mentions climate change.

5.2.4 Environmental Impact Assessment

Drafted and amended at times when climate change was not high on the agenda, this directive does not specifically call for climate change impact assessment, but rather for the assessment of significant impacts upon the various components of the environment. Nevertheless, the climate change impacts of projects have sometimes been assessed. The directive also calls for the ‘cumulation of effects’ to be assessed (see EIA Directive Annex III (1)) and non-project human activity such as emissions from transport, has also been a major cause of environmental impacts. EIA is intended to be a process which anticipates future likely environmental conditions (with and without the project). Mitigation or compensation measures proposed as a result of impacts generally might usefully take into account the need to provide sites and measures for biodiversity under a changing climate. There is a need to monitor the effectiveness of mitigation proposals, which may be affected by climate change.

5.3 EU research and climate change programme

Research programmes to assess the implications of potential climate change impacts have been planned, or are in progress, at EU level. Research in connection with adaptation measures has more recently been planned. The European Action Programme on Flood Risk Management of 2004 has led to a proposal in January 2006 for a directive on the Assessment and Management of Floods (CEC 2006a). The proposal mentions the likelihood of climate change exacerbating flood risk, and the effects that floods can have in destroying wetland areas and reducing biodiversity.

The second phase of the European Climate Change Programme (ECCP II) was launched in October 2005¹² (CEC 2005a). The first Programme was chiefly concerned with the reduction of greenhouse gas emissions in line with Kyoto Protocol targets, and adaptation will form a more significant part of ECCP II. A stakeholder consultation process on climate change and adaptation policies has begun in 2006, with objectives including the integration of adaptation into appropriate policy areas, and also awareness-raising. A Green Paper is to be published on this by the end of 2006 (WG 2006). The Impacts and Adaptation Working Group proposes to address, the topics of biodiversity and urban planning and construction.

5.4 EU Biodiversity Strategy

The European Biodiversity Strategy (CEC 1998) aims to anticipate, prevent and address the causes of significant reduction or loss of biodiversity at source, in order to reverse present trends in biodiversity decline and to place species and ecosystems at a satisfactory conservation status, both within and beyond the territory of the EU. It argues that without adequate biodiversity, events such as climate change are likely to have catastrophic effects - in other words, biodiversity helps protect against catastrophe. It recognises the complex processes of interaction of climate change with biodiversity, including the possible negative effects of actions to combat climate change (such as afforestation), and the role that spatial planning can play in the conservation of biodiversity. But this strategy does not expressly address the ways in which spatial planning can assist biodiversity to adapt. The Gothenburg European Summit in 2001 agreed on the EU Sustainable Development Strategy, an objective of which is to 'Protect and restore habitats and natural systems and halt the loss of biodiversity by 2010'. This target, known as the 'Message from Malahide', was reaffirmed at the Conference on Biodiversity and the EU in 2004 (Duke 2005). Participants at the BRANCH workshop in Brussels appeared to agree that halting the loss of European biodiversity by that date would be very difficult to achieve. The European Commission is expected to develop a Communication in 2006 on the delivery of the 2010 target (CEC 2005b).

The European Environment and Sustainable Development Advisory Councils (EEAC 2005) have commented on biodiversity conservation and adaptation to the impacts of climate change and the Gothenburg target. Recommendations from a 2005 conference of the EEAC held in Oxford include a call for continued development of the Natura 2000 network and implementation of sustainable management within and outside these areas. Moreover, the EEAC also calls for drawing attention to 'the importance of extending conservation planning across whole landscapes, halting net loss of habitat, enhancing ecological connectivity [...] and recreating ecosystems on a large scale'.

¹² the first phase was launched in 2000.

5.5 European strategies and directives and the issue of subsidiarity

There is a clear distinction between EU strategies, policy and legislation. Only directives require complete compliance, with their transposition into the domestic laws of each Member State. European Union strategies, such as the ESDP, have no force of law and only gain authority as a result of common agreement on broad principles. While the ESDP recognises the importance of the biological diversity of Europe and incorporates biodiversity in its approach to regional planning, it is only a non-binding principle of policy. Although it was approved by all EU Member States as the framework for future planning in Europe, the ESDP recognises that the EU does not have a land use planning remit and that such matters must be dealt with on the principle of subsidiarity - the principle that policy, laws and regulations should be made at the most appropriate level of the Union; issues of only local importance should be legislated for at the local level. Land use planning is therefore accepted as a local or region issues and not one where the EU should have competence. This position, therefore, reduces the weight or importance of the ESDP as a policy instrument.

Directives of the European Union are legislative instruments that have to be transposed into domestic law before they become fully operational within individual Member States. As with environmental legislation generally, directives are policy implementation instruments and, for example, the EIA Directive is seen as a key mechanism for achieving the EU's wider environmental concerns and policy principles (CEC 2001) Over the past decade or so the principle of subsidiarity has also been provided for in EU environmental directives by allowing Member States a certain degree of discretion in the manner of their implementation (Macrory and Turner 2002). The effect of subsidiarity has been for a wide variety of approaches to be developed for the implementation of the key environmental directives across the EU. The European Commission's 2003 five year review of the operation of the EIA Directive highlighted this variation by providing evidence of the different approaches used by member states in establishing, for example, thresholds for triggering the need for an EIA (CEC 2003a). Recent research into the operation of the other key environmental directives - Birds, Habitats and Water Framework – in the Wadden Sea regions of the Netherlands, Germany and Denmark, suggests that these directives are also subject to a wide variation in interpretation and application (Impacts Assessment Unit 2003). According to Syngellakis (1995) this level of discretion causes problems in both the consistency of application and implementation across the EU and in the monitoring of the effectiveness of implementation.

5.6 Summary and key findings

This section has demonstrated how the interaction of climate change, biodiversity and spatial planning has been understood at the European level. It has reviewed the existing policy instruments relating to biodiversity and the natural environment which have potential for addressing adaptation, and the further policy responses now under development.

However, it is also recognised that strategy statements, such as the ESDP, have severe limitations in achieving significant change in policy approaches towards addressing adaptation when they do not have legal standing. Furthermore, the trend in allowing greater discretion, under the principle of subsidiarity, in the implementation of key EU environmental directives may also hinder the development of a harmonised approach to climate change across the EU as a whole.

There has been as yet no evident integration of the need for climate change adaptation into EU economic, regional, agricultural, spatial, water environment or biodiversity policies or measures. At the European level the focus until recently has been upon the Kyoto process and achieving emissions targets and mitigation. This is gradually shifting, with some possible reforms underway during 2006. Nevertheless, it seems that response at the European level may be less rapid than at other levels of the policy process.

Key findings

- A series of policies, strategies and directives from the CEC are relevant to biodiversity response to climate change. These measures are not necessarily applied consistently across the EU nor are they always mutually supportive.
- Whilst adaptation and spatial planning for climate change impacts on biodiversity will need to be introduced within the EU legal framework, the EU has no responsibility for spatial planning, under the principle of subsidiarity.
- Nevertheless, measures are available which are important for protecting designated sites and compensating for any unavoidable loss and for improving the biological quality of the matrix surrounding them. Others provide for the appraisal of climate change impacts as a means to integrating the issue in policies and plans.

6 Policy into implementation

6.1 Introduction

The section aims to bring together the findings of the research process indicated in previous sections, where strategies, policies and measures were illustrated and shortcomings identified (section 3.3.1), and to link these to ways of implementing various measures, such as those described in section 4. It also shows what other forms of action are needed to secure implementation.

6.1.1 Implementation gaps

This research has shown that there is a good deal of policy support for climate change adaptation measures for biodiversity. This support is at regional and national level, much of it in the form of firm policy commitments. In implementing this policy, spatial planning can make reference to existing European policy such as the ESDP, the Thematic Strategy on the Urban Environment, the EU Biodiversity Strategy, the EU Sustainable Development Strategy and the forthcoming European Climate Change Programme II. Also, legislation such as the SEA, Birds, Habitats and Water Framework Directives, as well as national policy where it exists (such as in the Netherlands and England), can be used to steer developers and landowners towards best practice.

However, these policies have shortcomings. There has been as yet no evident integration of the need for climate change adaptation into EU economic, regional, agricultural, spatial, water environment or biodiversity policies or measures. At the European level the focus until recently has been upon the Kyoto process and achieving emissions targets and mitigation. This is gradually shifting, with some possible reforms underway during 2006. Nevertheless, it seems that responses at the European level may be less rapid than at other levels of the policy process.

At national level, the legal obligations for countries to meet the Kyoto Protocol targets have generated formal requirements (such as regulations and fiscal measures) in the area of climate change mitigation or reduction. By contrast, climate change adaptation has largely been framed in aspirational policy terms, relying on non-mandatory guidance or encouragement.

We consider that these policy commitments and the good work being done on the design of adaptation measures are, of themselves, unlikely to meet the full challenges of climate change and its impact upon biodiversity unless they are supported by enforceable implementation measures. The literature on policy implementation indicates that legal and financial measures are more likely to succeed (Hill 2005) than the voluntary measures that are currently the main mechanisms being used to implement adaptation strategies. While the policy statements made in regional and national government guidance provide at least some legitimacy for the demand for firm action on climate change, without legal or financial instruments to support that guidance, progress is likely to remain inconsistent and slow. Moreover, even where legal instruments exist, such as in the Netherlands Water Test (a mandatory requirement for each provincial and local spatial plan to consider the issues of water storage and retention in the plan), there are institutional obstacles (such as competing objectives and different assumptions) to its consistent implementation (LUC and others 2004). We therefore consider that institutional functions and remits need addressing.

6.1.2 Biodiversity and climate change adaptation through spatial planning

Earlier sections demonstrate that spatial planning is still at a preliminary stage with respect to addressing dynamic biodiversity in circumstances of climate change, and with regard to recognising and valuing ecosystem functions. Spatial planning systems in the partner countries of the BRANCH study have only recently begun to integrate more dynamic conceptions of biodiversity, such as the need for biodiversity space, green infrastructure, ecological networks and the integration of biodiversity into development, and in many cases adopt only short-term plan-horizons. While the Netherlands has a longer history of integrating ecological networks into spatial planning, through its Ecological Main Structure and Robust Corridors, practice in England is still developing, and in France is at the initial stages. The Netherlands case-study shows that the Limburg Province's integrated Environment and Spatial Plan (POL) promotes the establishment of the robust ecological corridor, but it seems that the network is not being consistently implemented across the country (LUC and others 2004), for some of the reasons described above. Nevertheless, we consider that progress will entail evolution beyond this position in order to respond to the new dynamics of biodiversity adaptation to climate change. The case studies show that spatial planning can support this directly, for instance where new development is planned, and indirectly, by setting a supportive policy framework for co-ordinated actions by a range of partners. The research found that, while some doubts have been expressed about the effectiveness of ecological corridors as a universal response (eg Hill and others 1993; Hill and others 2001; Catchpole, undated), there is support for wider ecological networks and green infrastructure, for the avoidance of fragmentation of existing habitats, for their enhancement, and for the safeguarding of future climate space where current sites are under threat. More consistent action to protect, enhance and create areas and conditions for biodiversity is a necessary condition for assisting biodiversity to adapt to climate change. In some cases, however, such as the loss of some coastal habitats under climate change, even co-ordinated actions may not be sufficient.

6.1.3 Implications

This review of policies and the national case-studies has shown that there are issues of competing objectives, lack of integration, and gaps in implementation, amongst these many initiatives. We consider that the setting of clear objectives for biodiversity and climate change adaptation is essential, and recommend therefore the use of appraisal tools such as SEA and Appropriate Assessments under the Habitats Directive to test objectives, to achieve consistency and to maximise opportunities for positive outcomes. The following sections discuss ways of achieving this, and other supportive actions such as promoting multiple benefits of biodiversity, partnership and the provision of information.

6.2 Implementation: available measures and instruments

A number of different approaches are needed because of different circumstances and powers of authorities in the different partner countries. A longer-term horizon and an overall strategic commitment are needed, but this must be accompanied by practical powers and - where necessary - by funding. The measures and instruments now available to planners and policy-makers are described briefly below; circumstances where they may be applicable are indicated in Table 6.1.

6.2.1 Policy objectives and plan-horizons

The findings show that not all spatial plans (at national, provincial and local levels) yet have clear objectives to adapt to climate change, nor objectives supportive of biodiversity. Moreover, many plans have short time-scales: the Netherlands is an exception in the case of their national spatial plan and some sectoral plans, such as for water and coastal areas. We therefore consider that the challenge of climate change adaptation offers an opportunity to raise the time-horizon of plans, to acknowledge the anticipated change in climate over the next 25, 50 and 100 years. Given that the built developments which are the outcome of many spatial plans have a design-life of 50-100 years, that climate changes may occur rapidly or slowly over that period, and that biodiversity similarly may adapt in unforeseen ways, it is important that plans, especially at the strategic level, take a longer-term view.

It is also evident that, even when spatial plans include objectives promoting biodiversity, these need reinforcing, to emphasise both biodiversity's intrinsic value and also the role that it can play in enabling adaptation in other sectors (multiple benefits such as flood-management, water, building design, and quality of life are discussed in 6.3). Some essential measures therefore are:

- adopting a longer-term plan horizon to take account of climate change scenarios;
- adopting an explicit spatial plan objective to adapt to climate change;
- awarding higher priority to biodiversity objectives or considerations in all spatial planning policy arenas in fulfilment of EU legislation and national requirements under the Convention on Biodiversity.

6.2.2 Policy integration, sustainability appraisal and climate-proofing

Where there are supportive policy objectives for biodiversity, policy integration needs to be achieved both horizontally and vertically. It is important for action to be taken at the appropriate scale. At the broadest scale, horizontal integration is needed across policy areas both within the remit of spatial planning, and interacting with it. A key feature of Dutch spatial planning is the existence of formal links between public policy sectors, for instance, integration of water management policies. The Dutch national spatial plan takes account of other national policies such as those on *Space for water, room for rivers* and the 3rd *Coastal management document*; the former is a model to some extent reflected in the *Making space for water* proposal in England, and may be recommended for French spatial planning. This should ensure the consideration of cross-sectoral measures, such as promoting water efficiency as a means to offset increased demand for water for existing populations, for new development, and for the needs of plants and wildlife under conditions of climate change. Policies should be tested against climate change scenarios. Vertical integration is also needed across the levels of the plan hierarchy to ensure national objectives for climate change adaptation are cascaded down, and that local knowledge is conveyed to policy makers. For instance, in France, integration is needed between the national *Plan climat* (which refers to the importance of adaptation at different territorial levels), the regional CPER, DTA for specific areas such as estuaries, water plans such as SAGE, the more local SCOT and PLU, and management plans for Natura 2000 sites.

One means to implement this vertical and horizontal integration at the provincial or regional scale is Sustainability Appraisal, evaluating plans in social, economic and environmental

terms. An example of the successful use of Sustainability Appraisal is in the drafting of the SE England Plan (the Regional Spatial Strategy) (see Annex 1), in which the strategy was appraised against objectives from the Integrated Regional Framework for the South East. This included objectives to adapt to climate change and to conserve and enhance biodiversity (SEERA 2006). At this scale also, policies and plans should be explicitly tested against the regionalised climate change scenarios.

At the site scale, the Habitats Directive makes non-mandatory provision for the development of a management plan for Natura 2000 sites, and Article 13 of the Water Framework Directive requires the development of management plans for each River Basin District (see 6.2.5). It is important to integrate these management plans, where they exist, into the development of the spatial plan. It is also important that climate change is considered in adopting the site conservation objectives, even if they can only be tested against the climate change scenarios in broad terms.

Compatibility appraisal is a simple tool used in sustainability appraisal (and SEA), which employs a matrix to examine the consequences of policies and objectives, and confirms that these are internally coherent within a plan and consistent with other strategic plans/actions in other plans. To assist with biodiversity adaptation to climate change, the comparison would be made between the array of policy objectives, adaptation to climate change objectives, and biodiversity enhancement objectives. Where incompatibility is found, it will be necessary to re-think the objective and/or policy. Compatibility appraisal can help to clarify trade-offs and is relatively simple to perform, though it is subjective and can be time consuming.

Sustainability Appraisal can incorporate climate change risk assessment: a decision-making tool for handling uncertainty is described at 6.2.8.

6.2.3 Policy and plan appraisal: Strategic environmental assessment and appropriate assessment

A legal requirement in all Member States is to undertake SEA (see section 5.3) to assess the environmental impacts of plans and programmes at national, provincial and local level. We consider that this has considerable potential to assist with the integration of biodiversity and spatial planning under conditions of climate change. Actions to take include:

- using the objectives as set out in 6.2.1, to generate climate change adaptation criteria for use in the SEA of development plans, including the interaction of the policy or proposal with biodiversity and climate change
- establishing the current baseline but also current and expected trends under conditions of climate change
- generating and evaluating alternative plans and options assessing impacts under conditions of climate change
- assessing the impacts of alternatives on biodiversity over the plan period and beyond, and the impacts of possible changes in biodiversity on the plans
- using the process to identify the scope for achieving multiple benefits for a range of objectives
- providing broad or more detailed costings of the economic value of biodiversity and ecosystem services.

Additionally, where screening of spatial plans shows that an Appropriate Assessment is required under the Habitats Directive, the appraisal should consider the plan horizon and the possible climate changes over that period, direct and indirect effects, and the interaction with other plans, across administrative and national boundaries where appropriate. As with sustainability appraisal, the scoping process for SEA should identify other relevant plans such as Natura 2000 management plans and the WFD river basin management plans.

Some guidance exists on SEA and climate change - the templates and guidance offered in Levett-Therivel (2004a and 2004b) can be adapted to take explicit account of biodiversity and climate change. However, we also consider it important that the wording of the SEA Directive is changed to make the direct and indirect consequences of climate change on the plan a 'minimum information' requirement under Article 5(1) and Annex 1 of the Directive.

6.2.4 Project appraisal: Environmental impact assessment and appropriate assessment

Assessment of project impacts (EIA) will lead to identification of potential mitigation measures for those impacts. EIA is intended to be anticipatory in nature, so climate change impacts upon wildlife resources should be assessed cumulatively with a planned project. An example is the Queenborough and Rushenden case-study in England (see Section 4.5), where climate change adaptation and biodiversity impacts are being integrated into the EIA process and master-planning stages.

Where project impacts on a designated Natura 2000 site are judged as likely to have a significant effect, an Appropriate Assessment must be carried out, under the Habitats Directive. This is a series of sequential tests that must be passed if a project is to go ahead. By including the consideration of climate change impacts in the assessment, impact mitigation (and perhaps compensation) may be sought via legal agreement. Mitigation measures would address the opportunities for avoiding cumulative project/climate change impacts on biodiversity, for reducing the severity of impacts and for enhancing biodiversity resilience.

EIA and AA are reactive approaches, only taking place where a project is planned, which reinforces the need for the anticipatory use of SEA and SA at the plan-formulation stage. Nevertheless, EIA and AA are existing mandatory tools that should be strengthened by explicitly requiring a consideration of climate change impacts and adaptation. The direct and indirect consequences of climate change on a project should be a 'minimum information' requirement under Article 3 of the EIA Directive.

6.2.5 Master-planning and site-design

Section 3 of this study has shown that the spatial planning systems of the three partner countries vary in the extent to which national policies are cascaded down through regional to local implementation. Only the Netherlands has a national spatial plan. But a clear statement of biodiversity requirements for development at provincial and local level can maximise the opportunities presented by that development to enhance, restore and create space for biodiversity. At the provincial or regional scale, the identification of area of biodiversity opportunity offers much potential (as in the SE Plan – section 3). At the master-planning stage of new development, a green infrastructure may be established to form part of the 'core

infrastructure' of the new development. English Nature and partners have made recommended standards for the extent of provision (see English Nature 2003). These rise, for example, from 2 ha of natural green space park in a neighbourhood, to 60 ha for a metropolitan area. The proposed standard for ecology parks and nature reserves is at least 1 ha per 1,000 population. Other standards are proposed for street tree canopy, communal 'doorstep' spaces and green buildings. The green infrastructure should respond to functional requirements including urban design principles, functional habitat networks, providing ecological services as well as opportunities for people and communities to experience nature. By building in this core green infrastructure at the master-planning stage, social and economic benefits can be maximised, as well as opportunities to develop a resilient and functioning biodiversity resource (TCPA 2004).

The case study of Queenborough and Rushenden shows the potential benefits to biodiversity, drainage, quality of life and thermal comfort of integrating climate change adaptation considerations into the overall master-plan. Land uses may be allocated for multi-functional purposes over different time-frames: for instance, land for formal recreational open space could become a water-meadow under certain conditions, and ultimately a permanent flood-storage area.

At the local or site level, development plans that assign designations for certain land uses should contain policies on what will be required to meet the challenges of climate change. Additional guidance can be given to the developer on how adaptation should be built into the new development, through measures such as planting schemes, shading and cooling for buildings and outdoor spaces, green roofs, wild areas, and phasing. There are a number of suitable check-lists or tool-kits to support such measures (such as SECCP 2005 and TCPA 2004).

6.2.6 Legal agreements with developers

Where significant impacts have been identified by EIA or AA, or where major new developments are planned, or designs for smaller-scale schemes are drawn up and offer opportunities for biodiversity, legal agreements may be entered into in the form of conditions upon development consent. Such agreements have typically been entered into to either improve the quality of a development, or provide community infrastructure. Examples range from the major scale, such as the Limburg Ecological Corridor (see Section 4.2.3) to more local commitments to elements of green infrastructure such as wildlife areas, buffer zones, wetland restoration, and sustainable urban drainage systems. These planning initiatives need support and reinforcement in the context of a changing climate, especially over issues of future maintenance.

At this smaller scale, this approach is reactive and will only be available where development is proposed, but can be integrated into the plans of other agencies, for instance over coastal re-alignment or river restoration. The importance of partnership working is discussed at 6.5.

Some local spatial planning authorities in the Netherlands and France may have the opportunity to intervene directly in the land market to deliver measures and land uses supportive of biodiversity.

6.2.7 Water Framework Directive

Although the Water Framework Directive does not explicitly address adaptation to climate change, its implementation offers significant opportunities to ensure that future conditions are considered in the process of River Basin Management Planning. This is a process designed to raise the ecological status of water bodies and to assist with flood management. After the character and pressures within a river basin have been assessed, a programme of measures is devised to raise the status of the river/water body towards 'good status'. The process means that there will be better availability of information and data covering the whole RBD, that water and environmental issues should be strengthened in planning guidance, and that it is possible more EIA work will be needed to accompany applications for development consent. RBMPs will become more effectively integrated into development plans as development plans will need to take more account of pressures upon water supply and quality, and subsequent measures to achieve good status (LUC 2005). River basin management planning has a heavy focus on stakeholder involvement and strengthens the potential for penalties to be imposed where there are infractions. Both these aspects may lead to more attention being given to environmental issues.

Programmes of measures established as part of the RBMP process may well include measures that also benefit wildlife, such as wetland enhancement, whilst by dealing with the whole-catchment the RBMP offers benefits for a wider, ecosystem-based approach.

6.2.8 Risk assessment

Risk assessment estimates the risk that products and activities cause to human health, safety and ecosystems. It involves identifying possible hazards, the exposure and vulnerability of receptors (for instance birds or the local economy), and identifying and analysing the likelihood and consequences of the resulting risks.

Risk assessment for climate change has been the subject of work by UKCIP and a detailed handbook, covering a variety of decision-making tools, has been prepared (UKCIP 2003). The elements of the UKCIP process are summarized in Box 6.4. The case-study of Queenborough and Rushenden illustrates the application of this framework to some elements of the regeneration master-plan for the area: an example is the risks that may be posed by 'coastal squeeze' (resulting from sea-level rise and hard flood defences) to both designated biodiversity areas (estuarial and marsh SPAs) and regeneration objectives of promoting the image of the area for eco-tourism.

Box 6.1 UKCIP Risk, uncertainty and decision-making framework

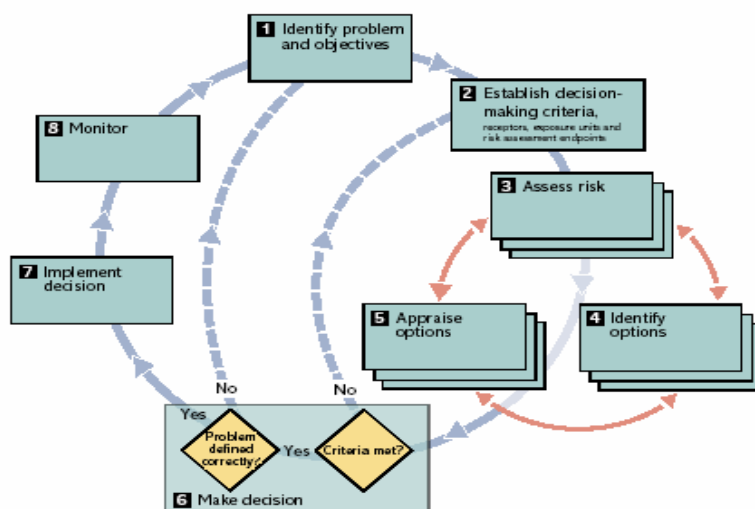


Figure 1: A framework to support good decision-making in the face of climate change risk

The six principal stages of the UKCIP process are summarized below. The sequence matches well with the SA and SEA tools being used during plan-formulation. Each stage requires a set of questions to be answered - a few of these are indicated.

Stage 1	Identify problem and objectives Why make the decision? For what objectives? Origin of need to decide? Timescale?
Stage 2a	Establish decision-making criteria Nature of criteria (eg risk)? Legislative context, constraints? Decision rules? Interaction with other policy?
Stage 2b	Establish exposure units, receptors and risk assessment endpoints Define receptors, exposure unit. Adequate resources and time available?
Stage 3	Preliminary climate change risk assessment Lifetime of decision? Likely significant variables? Level of uncertainty? Anything to screen out at this stage?
Stage 4	Initial options identification Type of options available? No regret, low regret, partial or full adaptation options available? What level of flexibility in options?
Stage 5	Initial options appraisal Rate options against criteria. Sensitivity analysis? Are more detailed assessments necessary?
Stage 6	Make decision Is there a clear preferred option? How would changing the criteria affect the decision?

source: Summarized from UKCIP (2003) *Climate change: Risk, uncertainty and decision-making*

Risk assessment can be used to compare options on the basis of the risk that they cause (or face) and can incorporate the precautionary principle. However risk assessment involves the use of assumptions and this will lead to varying levels of uncertainties in the result. Sensitivity testing is an appropriate tool to acknowledge these uncertainties, and to assess options for decision against different climate change scenarios. It is recognised that, when risk assessment is used together with cost-benefit analysis, making assumptions about the value of species or ecosystems (or human life), the result may be contentious.

6.2.9 Applicability of measures

Table 6.1 summarizes where the spatial planning measures described above may be particularly applicable:

Table 6.1 Summary: measures/instruments at different planning levels

What could be done	Instrument
Longer-term spatial planning time-horizon.	Plan formulation to set longer plan-horizon; frequency of periodic review.
Explicit objectives for climate change adaptation and enhanced resilience of biodiversity.	Plan-formulation. Risk assessment.
Policy integration.	Sustainability appraisal. SEA; River Basin Management Planning (RBMP) (in partnership with competent authority under WFD).
Ecosystem planning	
Ecosystem-view in spatial planning – acknowledging role of dynamic systems, and enhancing the resilience of biodiversity to a number of impacts.	Use of SEA, EIA and WFD-RBMP, especially at regional or provincial level. Sustainability appraisal. Risk assessment.
Landscape-scale view in spatial planning, including urban areas.	Consideration of wider value of landscape and urban-rural links in plan policies. Landscape frameworks. Involvement of local communities in locally-valued biodiversity.
Site and habitat protection, enhancement, creation and management	
Protection of existing sites, habitats and reservoirs of species which can eventually disperse to suitable habitats/climate space.	Site safeguard policy.
Green infrastructure or ecological networks.	National, provincial and local policy. Development standards for provision of infrastructure. Partnership working.
Habitat enhancement and creation in built development or urban areas, such as parks, gardens, semi-natural areas, urban river corridor restoration.	Policy - developers' contributions or development conditions. Opportunities mapping. Land market intervention. Partnership working.
Habitat creation: wetland, saltmarsh, woodland, heathland.	EIA, SEA, AA mitigation and compensatory measures. Opportunities mapping. Legal instruments. Partnership working.
Biodiversity or ecosystem-friendly land use.	EU agri-environment measures. Land, coastal and drainage management practices.
Increased ability to manage and maintain sites into future.	Policy at provincial and local levels. Legal agreements with developers. Land market interventions.
Monitoring.	SEA, EIA, BAPs. Plan review.

These conclusions, on the scope for applying measures, lead to a number of recommendations, detailed in Section 7.

6.3 Multiple benefits

A key issue for spatial planning is how far it can integrate biodiversity considerations into forward planning and development consent decisions driven by other sectoral objectives such as housing, flood defence or transport. A great deal will depend upon early consultation with the appropriate biodiversity agencies, infrastructure providers, landowners, developers, NGOs, local communities and other stakeholders. However, if it can be demonstrated that policies and approaches can also deliver flexibility for change, then the multiple benefits will increase the acceptability of the measures. Table 6.2 indicates some of the multiple benefits that might result from the climate change adaptive policies identified in Section 6.2. (As before, there is overlap across the scales suggested.)

Table 6.2 Multiple benefits of policies aimed at climate change adaptation

What could be done	Additional benefits (in addition to biodiversity benefits)
Longer-term spatial planning time-horizon.	Anticipation of, and adaptation to, the impacts of climate change on people, economic, social and environmental elements, maximising the beneficial opportunities and avoiding or mitigating the negative impacts.
Ecosystem-view in spatial planning.	Recognition of ecosystem benefits to people's health and well-being, quality of places, flood-management, and water storage and quality.
Landscape-scale view in spatial planning, including rural, semi-rural and urban areas.	Economic value of landscape as part of environmental economy. Urban-rural links in policies. Involvement of local communities in locally-valued biodiversity beyond designated habitats and species.
Protection of existing reservoirs of species which can eventually disperse to suitable habitats.	Socio-economic benefits (such as property value) Pest control. Food source for other desired species.
Green infrastructure or ecological networks, including patches and wider landscape.	Socio-economic benefits: health, aesthetics, property values.
Habitat enhancement and creation in urban areas.	Socio-economic benefits, such as housing value, health, and quality of life, plus environmental benefits, including rainwater infiltration, urban cooling, etc.
Habitat creation: wetland.	Reduction of flood risk. Pollution control. Carbon sequestration in bogs.
Habitat creation: saltmarsh.	Reduction of investment/maintenance costs for sea defences.
Habitat creation: woodland and heathland.	Recreation and health benefits. Aesthetic and economic values. Potential biomass resource (woodland). Soil protection. Ground-water recharge. Pollution control.
Biodiversity or ecosystem-friendly land use.	Protecting soils and water. Meeting specific management objectives.

What could be done	Additional benefits (in addition to biodiversity benefits)
Increased ability to manage and maintain sites into future.	Socio-economic benefits. Future resilience.
Monitoring.	Data gathering. Early warning of change.

6.4 Information requirements

Another key issue for spatial planning identified in this study is how it can accommodate uncertainty and imperfect information, for instance on to the ability of species and habitats to adapt to climate change. Useful information on the likely impacts of climate change might include good information on the physical environmental needs of species, and their climate space, as well as information on interactions with other species. At present our understanding of species' response to key environmental factors such as temperature and rainfall is derived from their current distribution only. Deficiencies in knowledge are being addressed by a research effort, for instance by other elements of the BRANCH project, by the EEA, by other European-funded projects on flood-risks, and coastal planning (eg FLOWS 2005, Hughes 2003, and Resource Analysis 2005), and under the BSIK research programme in the Netherlands (BSIK-Climate *Changes* Spatial Planning). Many of these initiatives are about better information (more reliable data), but are also intended to promote better communication and learning between stakeholders and other interests.

Realistically, spatial planning decisions have to be taken without the benefit of full information, and the process becomes one of managing risk: the contrasting risks of inaction, inappropriate action and challenge to action (a risk assessment approach is described above in Section 6.2.7). The precautionary principle has been discussed in project workshops - this principle, used in a targeted and proportionate way, may help in integrating biodiversity and climate change concerns into spatial planning. A fourfold approach may be to identify:

- clear acceptance that planned intervention is needed for biodiversity adaptation;
- the minimum level of information on habitats and species and their reactions to climate change which will permit adequate decisions to be made;
- the areas of information which are sufficiently robust for worthwhile extrapolations to be made;
- further specific information from research, at local and regional level which relates to both species and habitats - this may be available in some cases and would supplement the above 'minimum' information.

Understanding of the indirect effects of climate change is also very poor (Brooker 2004) and in particular, potential interactions between climate change effects and changes in land use. Other large scale 'drivers' (social and economic) make prediction of consequences of change very difficult to predict. It may be that some especially vulnerable species, for which information on appropriate protection measures is poor, are very likely to become extinct and therefore their protection may be impractical and not a high priority - this is a decision requiring leadership.

6.5 Partnership, monitoring and training

The new emphasis across Europe on a more integrated and holistic spatial planning perspective provides a framework in which action can be taken to support initiatives led by others (such as the competent authority's ecologist, NGOs which record information on species, local experts and local community groups). The increasing availability of GIS mapping and databases will assist in this process through their use in providing information and, importantly, visualisation tools under conditions of future climates (see, for example, Box 4.4).

The following measures are examples where planners can take the lead through preparing spatial and land use plans, master-plans and design guidance etc but where much of the implementation will need to be through partnerships of stakeholders:

- integrated approach to integrated coastal management zones (ICZM);
- integrated approaches to flood management, water retention and storage;
- integrated approaches to water-efficiency schemes;
- integrated approaches to energy generation and energy-efficiency;
- integrated approaches aimed at enhancing sustainable agriculture and rural development simultaneously to improve resilience of biodiversity to climate change, such as appropriate management of agricultural production systems including diversification, maintaining continuous ground cover and nutrient restoration, and agro-forestry systems.

Monitoring is important to both observe the impacts of climate change (together with any other impacts) and to assess the effectiveness of measures implemented. Much of the necessary monitoring can be achieved within the framework of the requirements imposed on forward planning by the SEA Directive and may be carried out by stakeholders including wildlife groups.

Training - and provision of training opportunities - is needed in the field of technical training for integrated climate change impact and vulnerability assessment and environmental management under climate change. Dissemination and training events around tools such as adaptation check-lists (SECCP and others 2005) or decision-making toolkits (UKCIP 2003) can be useful. Institutional capacity also needs to be built with respect to spatial planners' understanding of the multiple benefits of ecosystem planning and biodiversity under conditions of climate change. To support this activity there is a need for pilot and demonstration projects to take forward adaptation and strengthen adaptive capacity as well as exchange of experience on lessons learned in enhancing resilience to adverse effects of climate change upon biodiversity.

6.6 Summary and key findings

The implementation of measures to enable biodiversity to respond to the pressures of climate change in the ways outlined in this report will depend on:

- Longer-term spatial planning horizons.

- Policy support in the formulation of clear objectives for biodiversity and climate change adaptation.
- Use of appraisal tools.
- Use of standards for green infrastructure.
- Knowledge of site and management options and potential measures and their likely effectiveness.
- Powers (legal, financial and land ownership) to undertake necessary measures.

Not all these elements will come together consistently in all situations, with powers in the hands of relevant authorities, so planners and policy makers will often need to work in partnership with others, seeking a minimum baseline of information (such as potential restoration sites) and finding routes to obtaining necessary funding as available through agricultural, environmental protection or other provisions. This may mean emphasizing the multiple benefits and services that may be offered by biodiversity and functioning ecological systems. Action will need to be taken at different scales – from the integration of biodiversity elements in site and development planning, action across the level of a single or several linked habitats, integration of spatial planning and biodiversity in the landscape beyond protected areas, and through to actions intended to integrate planning and management across whole ecosystems.

Important to this is awareness of interactions between different sectors of activity and finding ways of appraising these in a changing context. Acknowledgement of wider social and economic benefits of ‘green infrastructure’ may help in finding win-win options for climate change.

Nevertheless, we consider that there is a need to move towards the use of legal and financial instruments as a means of implementation of adaptation policy and objectives.

Section 7 draws out the various recommendations from this section and previous review work to make recommendations for action at EU, national and more local levels.

Key findings

- To turn policy into action on the ground there must be a strategy/vision for biodiversity response to climate change with agreed objectives and targets.
- Appropriate powers (perhaps through partnerships) and enforceable measures are needed, and there must be access to funding for some actions.
- There is agreement that spatial planning approaches that enable natural processes to take place and enable biodiversity to thrive also lead to other socio-economic benefits.
- Research continues to be needed, but complete certainty is probably not achievable, so it will be necessary to proceed despite information shortfall on some issues; risk assessment will help to cope with this.

7 Recommendations for spatial planning for biodiversity under a changing climate

This section outlines the various recommendations which have emerged from the BRANCH review and consultation process. They are categorised as measures at European, national, regional or local level – though some have relevance at more than one level. It is recognised that it would be useful to prioritise these various recommendations, but this has not been possible within the current process and may best be done by stakeholders and practitioners working together within the national, regional and local context. A set of additional measures, beyond the planning process, are also listed.

First, the following two quotations are offered as encapsulating important messages in planning for biodiversity under climate change, for both policy and implementation.

“Adaptation strategies should aim to increase the flexibility in management of vulnerable ecosystems, enhance the inherent adaptability of species and ecosystem processes and reduce trends in environmental and social pressures that increase vulnerability to climate variability.” Hulme (2005)

“Aim for permeable landscapes, maximising biodiversity, ie both a wide genetic base and varied age structure.” (Participant at BRANCH Winchester workshop)

7.1 European (EU) level - recommendations

The following recommendations have emerged from the BRANCH process. Participants at the BRANCH Brussels workshop were offered an opportunity to comment on these recommendations after the workshop, and responses received were broadly supportive.

1	EIA and SEA Directives
	Review directives (assess objectives and process) in order to raise the profile of impacts of climate change upon biodiversity, and the priority given to adaptation measures. ‘Climate-proof’ directives and amend.
	Strengthen assessment of climate change impacts within environmental assessment of plans and projects, covering mitigation, compensatory measures and monitoring. Climate change impact assessment should be a minimum requirement included in appropriate Articles of these directives.
	Also, determine possible appropriate conditions on planning consents to assist in adaptation to climate change.

2	Birds and Habitats Directives
	Review these directives in the light of expected impacts of climate change, examining likely future status of Natura 2000 sites and need for flexibility.
	Develop policy on Natura 2000 network in the light of climate change impacts on biodiversity and processes.
	In line with Article 10 of the Habitats Directive, strengthen support programmes and measures to encourage and permit ecological interaction between areas of European importance for nature conservation
3	Water Framework Directive
	Emphasize the potential role of climate change impacts and adaptation in River Basin Management Plans under the WFD to identify potential future locations for climate change adaptation measures.
	Also review integration of planning for biodiversity and water.
4	Sustainability appraisal
	Promote sustainability appraisal of plans, critically evaluating of the performance of a plan against pre-determined social, economic and environmental criteria.
5	Potential legislative measures
	Assess the value of preparing a Climate Change Directive, and the nature of appropriate content as part of current EU Climate Change Programme Review Adaptation study.
	Ensure climate change impacts are included in forthcoming Soil Quality Directive.
	Integrate biodiversity planning into the proposed EU Floods Directive.
6	Other measures
	Introduce statutory management plans for Natura 2000 sites in all EU countries, and the plans should address the impact of climate change upon the area.
	Develop policy on non-native species (invading spp. and introduced exotics).
	Promote international coordination and collaboration in order to establish cross-border ecological corridors within the EU and between the EU and neighbouring states.

7.2 National and regional level planning - recommendations

The following recommendations are proposed to policy-makers and planners working at different levels of the planning hierarchy: at national (N), regional (R) or local/municipal (L) level. The recommendations in the first set are generally more relevant at higher levels (N and/or R). A second set which follows draws out recommendations for local level planning. It will be important for planners and policy maker at all three levels to find ways of integrating their efforts, developing mutually supportive - but locally relevant - policies and plans.

1. Spatial policies and plans	N	R	L
Recognise that biodiversity will change as a result of climate change, and agree policy promoting flexibility, not only protecting sites and conservation objectives but bringing forward measures to ensure that the wider landscape is also suitable habitat for biodiversity.	✓	✓	
Seek consensus on a national vision for biodiversity (sites, species, role in wider landscape and contribution to environmental processes and services).	✓		
Promote policies which have ‘knock-on’ benefits for wildlife: eg SuDS, green space, tree planting (‘win-win’ policies).		✓	✓
Strengthen policies for the protection of features likely to support and maintain biodiversity, eg undeveloped areas, ponds, unused brownfield sites, etc.		✓	✓
Enhance consideration of climate change impacts and adaptation potential in all plans and policies at national and regional level.	✓	✓	
Plan to avoid fragmentation of areas with habitat value/potential, and plan for de-fragmentation where possible.		✓	✓
2. Other policies			
Develop policies which avoid or reduce over-exploitation impacts, such as habitat loss eg as the result of tourism, as these will help taxa to adapt.	✓	✓	
Review plans and policies which might increase pressure on potential biodiversity sites (eg development schemes and incentives).	✓	✓	✓
3. Safeguarding for the future			
Introduce policies to safeguard land with biodiversity enhancement potential	✓	✓	✓
Make strategic provision for safeguarded sites for future dispersal of species and sites for new habitats.	✓	✓	
Build biodiversity enhancement sites into local and regional planning		✓	✓
4. Integrating plans			
Aim towards further integration of biodiversity-climate change adaptation in spatial plans using objectives, indicators and targets.	✓	✓	✓
Integrate plans for land and for water to assist spatial planning for biodiversity through WFD and other measures.	✓	✓	✓
Use sustainability appraisal as a measure to integrate sustainability aims into all aspects of development.	✓	✓	✓
5. Awareness and communication			
Recognise that biodiversity will change - the <i>status quo</i> will not be maintained - and develop communications strategies to raise awareness of climate change impacts on biodiversity.	✓	✓	✓
Strengthen the regard given to Article 10 of the Habitats Directive, and provide guidance on how to do so. Article 10 requires Member States to endeavour, where they consider it necessary, to encourage the management of features of the landscape which function as ‘stepping stones’ and are essential for migration, dispersal and genetic exchange. These include rivers with their banks, traditional field boundary systems, ponds and small woods.	✓	✓	

7.3 Local/municipal level planning - recommendations

The following measures are relevant at local/municipal level, but note that some recommendations given above under *National and regional levels* are also relevant at the local/municipal level.

	L
Carry out appropriate assessment of local/municipal plans (in accordance with Habitats Directive) with a view to climate change impacts upon biodiversity.	✓
Undertake a review of the local development plan or framework to identify long-term suitability of existing nature conservation sites.	✓
Identify sites with potential for managed evolution into future habitat sites.	✓
Increase the level of protection for development given to all sites with existing or potential future interest for nature conservation.	✓
Safeguard biodiversity-rich sites and sites with potential as future functional corridors.	✓
Integrate climate change and biodiversity within supplementary planning guidance and conditions on planning consents.	✓

7.4 Other measures

A further set of measures have emerged during the course of the BRANCH policy review project. These require the involvement of individuals beyond the policy community working on spatial planning.

	N	R	L
Promote a national vision on biodiversity and climate change - impacts and adaptive responses.	✓		
Promote awareness via science and visualisation techniques , such as software that can assist in identifying suitable areas for biodiversity enhancement and techniques that assist in projecting likely future movement of species, also tools for visualising future landscapes.	✓	✓	
Develop biodiversity adaptation partnerships between bodies responsible for locations between which biodiversity might move/be moved.		✓	✓
With partners, make plans for research on planning for adapting planning for biodiversity under a changing climate.	✓	✓	✓
Develop policies and plans for monitoring measures to adapt biodiversity provision in the light of climate change.	✓	✓	✓
Develop and evaluate design options (eg on buffers, environmental gradients, etc.).		✓	✓
Develop and fund pilot projects for stepping stones and corridors and networks.		✓	✓
Enhance communications between planners and researchers; bring forward guidance and disseminate best practice cases.	✓	✓	
Consider strategic land banking for compensation.	✓	✓	

8 Seizing the day: opportunities before planners and policy-makers

A number of opportunities exist to influence both awareness of the link between biodiversity and the plans and policies which address this. Some of these are listed below, as an aid for taking action.

8.1 EU level

Review and consultation

- A stakeholder consultation process as part of ECCP II on climate change and adaptation policies has begun in 2006, with objectives including integration of adaptation into appropriate policy areas, but also awareness-raising. Ten thematic meetings are to be held between April 2006 and June 2006.
- An EU Green Paper is to be published for public consultation on Adaptation to Climate Change, by the end of 2006.
- White Paper on European governance (which proposes opening up the policy process and getting people and organisations more involved with shaping and delivering EU policy).
- On-going review of the Common Agricultural Policy (CAP).

Strategy development process

- Cardiff integration strategy process (integrating environmental issues into sectoral policies)¹³.
- Embedding of environmental objectives in the Lisbon process (this is the ten year strategy to make the EU the world's most dynamic and competitive economy).
- The European Communication on Biodiversity (forthcoming - stakeholder consultation closed 6 February 2006).
- Water Framework Directive: by the end of 2006, the following is to be achieved: monitoring programmes to ensure comprehensive view of water quality status are to be made operational within each river basin district (article 8); and a timetable and work programmes for the production of river basin management plans are to be published and consulted upon for each river basin district (article 14).
- The EU is committed to producing a Thematic Strategy on Soil Protection in accordance with the 6th Environment Action Programme, and a final proposal is due 2005/06.

Events and meetings

- The annual European Commission Green Week focuses on biodiversity in 2006 (starting May 31).
- Commission will also host a Conference on Adaptation in November 2006.

¹³ "The roles and responsibilities for carrying forward the Cardiff process and the EU SDS are unclear, and leadership is not consistent" (EEA 2005a)

- Structural Funds Open Days (organised with Regions) October 9 - 14, this year focussing on 'Investing in Europe's Regions and Cities'.
- European Environment Advisory Committee - Biodiversity Working Group meetings.

8.2 National level: France, Netherlands, UK (England)

National opportunities for addressing adaptation needs for climate change and biodiversity will arise in connection with revision of both planning/development policies and other sectoral policies, eg transport, minerals, flood defence and agriculture, and the stakeholder consultation process. For example in the UK a number of relevant consultations have recently closed, eg on the UK Climate change Programme and on the National Adaptation Policy Framework (Defra, see <http://www.defra.gov.uk/environment/climatechange/uk/adapt/policyframe.htm#consult>) An ODPM stakeholder consultation on PPS 25 - Planning and Flood risk also ended in February 2006.

Further consultation opportunities will arise in each of the partner countries in the coming months and years as policies and programmes are reviewed and it is important that policies that address the impacts of climate change on biodiversity are inserted in these strategies and statements as far as is necessary. Such policies would relate to policy appraisal, biodiversity protection and enhancement, environmental and sustainability assessment work and aspects of mitigation and compensation for environmental impacts.

During 2006 EU Member States are to publish and consult on a timetable and work programmes for the production of river basin management plans for each river basin district (article 14 of WFD). See below, also.

8.3 Regional level and local/municipal level

The principal ways in which local and regional opportunities will arise for influencing spatial planning and policy with respect to biodiversity and climate change will be in connection with either

- drafting or revision of provincial/regional or local/municipal spatial plans; or
- project proposals.

In the former case SEA (and, if appropriate, sustainability appraisal) of plans offers the possibility of incorporating climate change and biodiversity considerations. A number of questions should be inserted into the appraisal at different stages to provide information on:

- biodiversity interest in the plan area and its vulnerability to climate change (including recent trends);
- any in-combination/cumulative effects of the plan and climate change, (or from the plan, climate change and other activities), both within and beyond the plan area;
- any in-combination/cumulative effects of the plan *alternatives* and climate change, (or from the plan alternatives, climate change and other activities), both within and beyond the plan area;

- any potential biodiversity enhancement measures for climate change-related and any cumulative effects of the plan, if available;
- any impact mitigation and/or compensation measures for climate change-related and any cumulative effects of the plan, if available;
- any adaptation measures which may be incorporated into the plan.

In the case of plans affecting a Natura 2000 site of European wildlife interest, spatial planning authorities are also required to undertake an Appropriate Assessment of impacts affecting the site. Appropriate Assessment is required under the SEA Directive (92/43/EC); this assessment may include climate change impacts and cumulative effects including climate change.

The Water Framework Directive's river basin planning process also provides significant opportunities at regional/catchment level. River Basin Management Plans are to be available in draft form (including programmes of measures) at the end of 2008. Any significant water management measures - and these could perhaps arise in connection with climate change - are to be identified by the end of 2007. The WFD process has a strong stakeholder involvement process providing opportunities for climate change impacts upon biodiversity to be identified and mitigated/compensated.

Project proposals submitted for planning permission will normally require EIA. This assessment process should also explore whether either

- the project will itself directly or indirectly generate greenhouse gas emissions; or
- climate change impacts acting singly or in combination with the environmental impacts of the project (and other activities) may lead to adverse impacts upon biodiversity.

Where either of these possibilities occurs it will be necessary to introduce mitigation measures for any significant impacts, and to consider alternatives to the project.

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Glossary and abbreviations

Adaptation	Policies, practices and projects which can either moderate damage and/or realize opportunities associated with climate change
Adaptive Capacity	The ability of a system to adjust to <i>climate change</i> (including <i>climate variability</i> and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (IPCC 2001b)
AONB	Area of Outstanding Natural Beauty (England)
Appropriate assessment	Assessment of plans and projects likely to have a significant effect on a European Site as required by Article 6(3) of the Habitats Directive (see Sec. 5.3)
Biodiversity	'The variability among living organisms from all sources including, <i>inter alia</i> , terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.' (Convention on Biodiversity (1992), Art. 2)
Biodiversity Action Plan (BAP)	Any formal inter-agency plan produced by Parties to the Convention on Biodiversity, setting out actions to restore or enhance the status of species and habitats of conservation importance and concern. May be local, regional or national. Each Local Biodiversity Action Plan (LBAP) works on the basis of partnership to identify local priorities and to determine the contribution they can make to the delivery of the national Species and Habitat Action Plan targets. Often, but not always, LBAPs conform to local authority boundaries
BRANCH	Biodiversity Requires Adaptation under a CHanging climate; programme funded by Interreg III
Brownfield	In common usage, brownfield refers to previously developed land or derelict land, covering a range of sites in terms of size and location. They may have real or perceived contamination problems and may require intervention to bring them back into use.
CFMP	Catchment Flood Management Plan (England)
CHaMP	Coastal Habitat Management Plan (England)
CIADT	Inter-ministerial committee for spatial planning and development (Comité interministériel de l'aménagement et du développement du territoire) (France)
Climate-proofing	Actions taken to protect infrastructure, systems and processes against projected climate impacts for a period into the future.
Climate space	For a species or habitat, the areas which are suitable for it in climate terms (other factors, eg soil suitability, would be an additional factor).
CNADT	National Spatial Planning and Development Council (Conseil national d'aménagement et de développement du territoire) (France)
Coastal squeeze	Areas of saltmarsh or mudflat that become trapped between the seawall and rising sea levels
Compensatory measures	Measures introduced to compensate for damage or loss of designated sites caused by development after the implementation of all possible measures to mitigate this damage or loss.
Conservation objectives	At the time a European Site is proposed, a citation is produced which identifies the interest or conservation features for which the site is designated. The conservation objectives for the site ensure the interest features are being maintained in a favourable condition on the site. These objectives define what constitutes favourable condition for each feature by describing broad targets, which should be met if the feature is to be judged favourable.
Consultation bodies	Organisations which must be consulted in the EIA or SEA process.
Cumulative impacts	Impacts which result from the incremental effects of an action when added to other past, present and reasonably foreseeable future actions.

DATAR	Commission for Spatial Planning and Rural Development (Délégation a l'aménagement du territoire et l'action rurale) (France)
DEFRA	Department for Environment, Food and Rural Affairs (UK)
DIREN	Regional Environmental Directorate (Direction Régionale de l'Environnement, France)
DTA	Spatial Planning Directive (Directive territoriale d'aménagement) (France)
Environmental impact assessment (EIA)	The process by which information about the environmental effects of a project is collected, analysed, and taken into account by the relevant decision making body before a decision is given on whether the development should go ahead.
ESDP	European Spatial Development Perspective
Exposure to climate change	The nature and degree to which a system is exposed to significant climatic variations (IPCC 2001b)
Favourable conservation status	For habitats, status is considered favourable when: the natural range and area it covers are stable and increasing; and, the specific structure and functions necessary to its long term maintenance exist and are likely to exist into the foreseeable future. For species, status is considered favourable when: population dynamics data indicate that it is maintaining itself on a long term basis as a viable component of its natural habitat; the natural range is neither being reduced or is likely to be reduced into the foreseeable future; and, there is, and will continue to be, sufficient required habitat to maintain its populations on a long-term basis.
GICC	Management and Impacts of Climate Change (Gestion et impacts des changements du climat) (France)
Green infrastructure	Green infrastructure is the sub-regional network of protected sites, nature reserves, greenspaces, and greenway linkages. The linkages include river corridors and flood plains, migration routes and features of the landscape, which are of importance as wildlife corridors (TCPA 2004)
HAP	Habitat Action Plan
ICZM	Integrated Coastal Zone Management
Indicator	A measure of a variable over time, eg flowering date of given species, proportion of national area occupied by designated sites, etc.
Indirect impacts	Impacts that are not a direct result of the strategic action but occur away from the original impact and/or as a result of a complex pathway.
IPCC	Inter-governmental Panel on Climate Change
JNCC	Joint Nature Conservation Committee (UK)
Land banking	A formal mechanism for compensating for expected environmental damage. It involves the identification of land similar to that affect by a proposal or plan (including managed realignment) in terms of type, area, value for wildlife and processes impacted. The land bank may be set up by developers and others.
LDD - LDF	Local Development Document - Local Development Framework (UK)
LDD - LDF	Local Development Document - Local Development Framework (England)
Leaf area index	'Green-ness': total photosynthetic surface per m ² of ground surface.
Lisbon agenda	In March 2000, the EU Heads of States and Governments agreed to make the EU 'the most competitive and dynamic knowledge-driven economy by 2010'.
LNR	Local Nature Reserve
LNV	Ministry of Agriculture, Nature and Food Quality (Ministerie van Landbouw, Natuur en Voedselkwaliteit, Netherlands)
LPA	Local planning authority
Managed realignment	Managed actions to return to marine status areas reclaimed from the sea and to encourage the replacement of engineered defences with natural coastal wetlands and saltmarsh.
MEDD	Ministry for Ecology and Sustainable Development (Ministère d'écologie et du développement durable) (France)

MIAT	Ministry of the Interior and Spatial Planning (Ministère de l'intérieur et de l'aménagement du territoire (France))
Mitigation	A measure to avoid, reduce, or provide remedy for significant adverse impacts.
MNP	Environmental Assessment Agency (Milieu en Natuur Planbureau, Netherlands)
MONARCH	Modelling Natural Resource Responses to Climate Change (research projects sponsored by UKCIP)
Monitoring	Surveying and interpretation of results carried out for the express purpose of detecting trends over time. For purposes of EIA and SEA monitoring is carried out to determine whether impacts occur as predicted, to detect unforeseen changes and to provide a basis for remedial action. Monitoring usually focuses on certain key indicators.
MTETM	Ministry for Transport, Infrastructure, Tourism and the Sea (Ministère des Transports, l'Équipement, le Tourisme et la Mer (France))
Natura 2000	Network of the EU's most highly valued sites for nature conservation, protected by Habitats Directive.
NEN (EHS)	National Ecological Network (Ecologische Hoofdstructuur, Netherlands)
NGO	Non-governmental organisation
NPDSP/ Nota Ruimte	National Policy Document on Spatial Planning (Nota Ruimte: Vijfde Nota over de Ruimtelijke Ordening) (Netherlands)
Objective	A statement of what is intended, specifying a desired direction of change.
ONERC	National Observatory on Climate Warming (Observatoire national sur les effets du réchauffement climatique) (France)
PFCI	Provincial Forums for Coastal Issues (Netherlands)
Phenology	The study of the relations between climate and periodic biological phenomena (such as bird migration or plant flowering)
Plan	A set of co-ordinated and timed objectives for the implementation of a policy
Policy	The inspiration and guidance for action, setting a framework for subsequent plans and programmes
PPG	Planning Policy Guidance Note (England)
PPS	Planning Policy Statement (England)
Programme	A proposed set of linked projects or a series of similar or related projects proposed within a particular area.
Project	The execution of construction works or of other installation or schemes, or other interventions in the surroundings and landscape (EU Directive 97/11/EC)
PSA	Public Service Agreement (England)
RBMP	River Basin Management Plan
Resilience (ecological)	The magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behaviour. Or: the speed with which a disturbed system returns to equilibrium or the same general state after being changed
Responsible authority	The authority responsible for preparing a spatial plan or programme and carrying out the required SEA
RSPB	Royal Society for the Protection of Birds (UK)
Robustness	Robustness is the ability of a system to maintain function even with changes in internal structure or external environment
SAC	Special Area of Conservation
SAGE	Water management and planning Scheme (Schéma d'aménagement et gestion d'eau, France)
SAP	Species Action Plan
SCOT	Spatial Land Use Plan (Schéma de Cohérence Territoriale, France)

Sensitivity to climate change	Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct (eg, a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (eg, damages caused by an increase in the frequency of coastal flooding due to sea level rise) (IPCC 2001b)
SDAGE	Schema Directeur d'aménagement et de Gestion des Eaux (France) (SDAGE will effectively become the equivalent of RBMPs under the WFD)
SMP	Shoreline Management Plan
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest (UK)
Strategic Environmental Assessment (SEA)	A systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision making on par with economic and social considerations (Sadler and Verheem 1996) (SEA Directive: 2001/43/EC)
SuDS/SUDS	Sustainable drainage systems or sustainable (urban) drainage systems: a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques (may also be referred to as SuDS). Includes: swales, bioretention, basin ponds and wetlands, etc.
Sustainability appraisal (SA)	An 'assessment of activities, projects, programmes, plans and/or policies which applies social and economic sustainability criteria as well as environmental ones and considers the integration and reconciliation of different criteria' (Levett 1997). Sustainability Appraisal includes economic and social inputs, providing a critical evaluation of the performance of a plan against pre-determined social, economic and environmental criteria, to improve plan performance.
Target	Detailed, quantitative objectives that can be monitored
UKCIP	UK Climate Impacts Programme
VROM	Ministry of Housing, Spatial Planning and the Environment (Netherlands)
Vulnerability to climate change	The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity (IPCC 2001b)
WFD	Water Framework Directive
WLMP	Water Level Management Plan (England)

Annexes

- Annex 1 Summary of policy review
- Annex 2 EU legislation regarding nature conservation
- Annex 3 BRANCH Policy review workshops and consultation
 Winchester
 The Hague
 Brussels
 France

Annex 1 BRANCH policy review

Current policy on biodiversity under a changing climate

1 Introduction

1.1 Plan types and caveats

This annex presents an evaluation and analysis of the extent to which adaptation is being incorporated in various types of spatial plans, policies and strategies affecting the natural (and built) environment. The chapter is structured to cover the hierarchy of plans in the UK, then the Netherlands, then France. The review was carried out in July 2005 and therefore covers documents published by that date. Plan and policy preparation is an on-going process, and this review presents a snapshot of the position at that time.

Strategy, plan and policy types reviewed here include those at national, regional and local level. They have been developed principally either to guide development and provide advice or in response to either pressures for change or in response to threats. The majority have been drawn up for reasons other than climate change and biodiversity protection, so these issues are not always addressed directly. Many of the plans and policies, although still valid, were drawn up when climate change awareness was lower and there was less preparedness for response. Generally speaking plans, policies and strategies drafted more than five years ago are very unlikely to include any reference to adaptation to climate change. Many plans and strategies are due to be updated and revised in response not only to climate change but other pressures and legislative change.

Common barriers to stakeholder engagement with climate change issues have been identified elsewhere (West and Gawith 2005) as including: uncertainty about the nature and extent of climate change and its impacts; the complexity and challenge of the climate change impacts and adaptation message; the planning horizons of many stakeholders are short compared to those of climate change; and resource constraints. Spatial planners also face these barriers.

In some cases the spatial plans/policies have been devised in order to guide integration of potentially conflicting forms of land use and development - in such cases policy guidance aims at compromise and is therefore less prescriptive and more 'strategic'. The guidance will consequently be more open to interpretation or be more 'flexible'.

The strategies, plans and policies reviewed here include those produced by central and local government departments, by government agencies as well as non-statutory plans, etc. for sites (eg designated sites, shorelines and estuaries, habitats, etc.). All these should fit together hierarchically, functionally and with respect to locations in order to guide, control and respond to environmental change.

Climate change impacts may be both direct and indirect (eg acting for example through changes to water regimes) and importantly, impacts may interact and may also be cumulative. Thus, in addition to policies related to biodiversity/nature conservation and climate change adaptation, it is also necessary to consider the range of planning policies which relate to such issues as

- development of land and natural resources (for housing, transport, farming, etc.)
- management of water resources (inc. abstraction), river flows and flood risk
- soils protection and stability
- coastal zone planning

1.2 Review criteria

The review criteria used were:

- the reference to/acknowledgement of climate change in broad (unspecified) or precise terms;
- reference to the timescales thought to be involved in climate change and the time horizon of the spatial plan/strategy
- identification of impacts upon natural environmental resources (soils, water, habitats and landscapes); ideally, the following characteristics of sites might be mentioned (IPCC 2001):
 - vulnerability to climate change¹⁴
 - exposure to climate change
 - sensitivity to climate change
 - adaptive capacity
- identification of potential impacts of climate change, direct or indirect, specifically upon biodiversity
- identification of impacts upon natural processes and upon interactions between those processes;
- identification of cumulative impacts of climate change

And then, for the future implementation of the plans, identifying whether or not the policies/plans:

- propose mitigation measures (ie addressing need to cut emissions)
- propose adaptation measures (facilitating adaptation to climate change)
- make recommendations for working with changing environments
- identify existing practice, including providing flexibility
- discuss issues surrounding:
 - climate change impacts within valued habitats which have been made or strongly influenced by human activity (eg quarries, solid-built flood defences);
 - compensatory provision/safeguarding of space for future habitat development)
 - compromise where potentially conflicting activities are to co-exist.

Section 5 draws together a set of findings from this array of strategies, plans and policies from the three countries, summarizing their strengths and weaknesses and identifying opportunities and threats for the future.

¹⁴ see glossary for definition of these terms

2 United Kingdom

2.1 UK national and regional policy on climate change and biodiversity

2.1.1 UK national policy

Building on earlier UK sustainable development policy work, the current UK strategy on sustainable development (*Securing the Future: delivering UK sustainable development strategy*, HM Government 2005) highlights climate change and states that: ‘sustainable development and climate change are two vitally important and interrelated challenges facing us in the 21st century’. With regards to biodiversity, this strategy states that ‘the interdependence of environmental goals, particularly climate change, oceans and biodiversity, will be widely recognised’.

Under the UN Millennium Goals and the 2002 UN World summit on Development (Johannesburg), the UK’s key targets and commitments include the commitment to ‘reduce significantly the current rate of biodiversity loss by 2010’. Policy to implement this is not strong, however, stating: ‘Where evidence exists of likely harm to ecosystems or biodiversity, we will adopt practices that avoid irreversible damage’ (p. 101, HM Government 2005).

The UK planning system is in the process of moving to shorter, more focused policy statements (PPS) and all planning policy guidance (PPG) is being reviewed. This allows for the issue of climate change to be incorporated as the PPGs are revised - hence the most recent (2005) PPS, which is the over-arching one *PPS1 Delivering Sustainable Development*, contains a significant recognition (certainly not present in the earlier PPG1 from 1994) of climate change. The second key principle of PPS1 requires that development plans address the causes and impacts of climate change.

Although PPG 25 *Development and Flood risk* (2001) clearly acknowledges climate change, *PPS9 Biodiversity and Geological Conservation* (published August 2005) makes only limited reference to climate change (it is mentioned in the context of regional and local strategies), even though it is specifically geared to the context set by the biodiversity strategy for England, *Working with the Grain of Nature*. This latter does recognise climate change as ‘one of the most important factors affecting biodiversity and influencing our policies.’

The national water resources strategy *Directing the Flow: Priorities for Future Water Resource Policy* (DEFRA 2002), and the consultation on *Making Space for Water* (DEFRA 2004) specifically acknowledge climate change – in the latter as a major driver of future flood and erosion risk. *Making Space for Water* also proposes that, in accordance with guidance from 2000, water level management plans should be used to bring SSSIs into favourable condition. (See section 4.3 below)

2.1.2 English Nature policy

English Nature is the government agency with responsibility for protection of biodiversity in England. The agency issued the position statement *Climate change and nature conservation* in October 2002 which acknowledged the clear evidence of climate change impacts upon plants and animals, including those characteristic of the English countryside. The changes

observed were noted as relating to changes in populations, ranges, migration patterns and seasonal and reproductive behaviour of certain species. In 2002 the agency predicted probable increase in effects over time, singling out coasts and uplands as likely to experience most marked change.

The English Nature's climate change programme at that time aimed to evaluate impacts of 'inevitable' climate change and to find ways of accommodating those, either through building on existing activities or via new approaches. The programme thus consisted on scientific research to include understanding of relevant factors, building partnerships with other organisations. English Nature undertook to adapt its nature conservation policy and practice to address climate change, not only by protection of designated nature conservation sites but also by taking a more dynamic approach and emphasizing the role of the wider countryside to provide effective ecological links between areas of semi-natural habitat across the farmland/forestry landscapes. Other English Nature policies relate to mitigation of climate change effects via emissions reduction.

Guidance for land and biodiversity managers and policy makers

English Nature policy was reviewed in 2005, leading to guidance (Hopkins and others 2005) aimed at those land and biodiversity managers and policy makers. The guide touches briefly on mitigation of climate change but concentrates on adaptation measures. The guide stresses the need for dynamic and flexible management of wildlife, seeing biodiversity sites as components of wider landscapes. Seven guidelines are proposed:

- 1 Conserve protected areas and other high quality wildlife habitats.
- 2 Reduce other harm - this guideline refers to practices seen as threats: abandonment of management, overgrazing, nutrient enrichment, entry and spread of non-native species, industrialization of agriculture and over-abstraction of water.
- 3 Protect species range and habitat variation via conservation frameworks, retaining species in as many locations as possible, as the level of risk will vary from site to site.
- 4 Conserve and enhance variation within the landscape, maintaining patches of habitable space with diverse characteristics (water, vegetation, slope, aspect, etc.)
- 5 Establish ecological networks maintaining linkages across landscapes by habitat restoration and creation.
- 6 Respond to species decline by thorough analysis of causes of change, recognising other causes than climate change and intervening appropriately.
- 7 Adopt adaptive conservation targets and priorities reviewing conservation targets regularly and changing protection measures in considered ways.

Hopkins and others (2005) go on to conclude that the development and implementation of landscape management plans, to support biodiversity under a changing climate is the greatest medium term challenge.

Guidance on changing coastlines

English Nature's Maritime Strategy recognises the need - in the face of climate change and sea level rise - to work with dynamic coastal processes where possible, and that this may entail the removal of hard defences or changes to unsustainable management practices. This approach is seen as likely to allow the migration development of coastal habitats further inland and permit reinstatement of more natural functioning systems.

A paper prepared for the Executive Committee of English Nature (Burn & Collins 2005) takes the Maritime Strategy further and presents a decision framework for dealing with freshwater habitats in the sustainable management of coasts. The paper acknowledges that the rate of coastline change will continue to increase and that some existing defences are 'no longer technically viable or economically sustainable' and that consequently principles are needed to guide advice given to decision-makers. Three broad options are noted with regards to coastal freshwater habitats at risk: hold the line, managed realignment and managed realignment and/or no active intervention. Principles to be considered in decision-making cover: the balancing of both freshwater and coastal nature conservation requirements; sustainability considerations; the resilience or re-creatability of vulnerable freshwater habitat; scale and proximity considerations; compliance with relevant legal requirements and BAP objectives. Whilst this paper considers only freshwater habitats, the principles are intended to apply equally to brackish and saline systems behind managed flood defences. The paper also contains proposals for improving English Nature's engagement with stakeholders on changing coastlines.

2.1.3 Regional policies

At the regional level, *PPS11* (the guidance on the preparation of Regional Spatial Strategies (RSS) requires RSSs to take account of other national or regional strategies (such as any on climate change), and work on the new RSS for the South East has taken seriously issues of the natural environment and climate change. The Consultation Draft *a clear vision for the south east: the south east plan core document* (2005) included a specific policy:

Policy CC2: the strategy and policies of the plan will have regard to the opportunities and threats posed by climate change and seek to support an implementation programme of mitigation and adaptation.

This policy was strengthened in the *Draft south east plan core document* (submitted to the Assembly in July 2005). The elements on mitigation have been amplified, and for adaptation it states:

'Adaption [sic] to risks and opportunities will be achieved through:

1. guiding strategic development to locations offering greater protection from impacts such as flooding, erosion, storms, water shortages and subsidence....
[...]
5. ensuring that opportunities and options for sustainable flood management and migration of habitats and species are not foreclosed.'

2.1.4 Summary conclusions: national and regional policy

Climate change is certainly being included as a key issue or driver of change in more recent national and regional plans and strategies. Moreover, it is seen as a current, and not just a longer-term, issue. However, the specific policies and measures to be implemented for biodiversity adaptation to climate change are rather vague and imprecise. While all plans acknowledge the need for cross-sectoral integration, there is a danger that specific measures are seen as the responsibility of other sectors' action plans. It may be that the lack of

precision in adaptation measures is due to a lack of experience in the best way to guide the complex balance of natural and planned adaptation.

- National policy documents reviewed, eg *Making space for water* specifically emphasise the need to work with natural processes, as a way of strengthening a sustainable approach to problems of flood-risk and erosion, and integrating with the requirements of the Water Framework Directive. *Directing the flow* is an example of where the impacts of climate change - higher temperatures and more frequent periods of intense rainfall - are identified, but these surprisingly are not directly linked to biodiversity.
- Issues of climate change affecting natural processes - functional floodplains, washlands and coastlines - are addressed in PPG 25 *Development and flood risk* (2001) currently being revised.. LPAs are required to address the problems which flooding can cause.
- The *Draft south east plan* core document links the requirements for adapting to climate change and natural processes to opportunities for biodiversity in the coastal zone.
- Integrating plans: The biodiversity strategy *Working with the grain of nature* is specifically aimed at integrating biodiversity considerations into other sectors such as agriculture, water, forestry, and towns and cities. Other strategies also advocate an integrated approach: the national water strategy *Directing the flow* and *Making Space for water*, whilst PPG 25 similarly emphasizes (in para. 39) the links between statutory development plans and non-statutory plans.
- Time scale: *Working with the grain*, the Biodiversity Strategy, sets out a programme of work for 5 years, to be annually monitored and reported on in 2006. *PPS1* encourages RPBs and LPAs to look to the future, not focussing on the short term. The *Draft south east plan core document* has a 20-year horizon to 2026.
- Flexibility: there are some problems in integrating the messages from sectoral strategies such as *Working with the grain*, with specific implementation programmes, into the more discretionary and flexible statements of national planning policy.
- Response through adaptation: There has been a tendency for more emphasis in national and regional policies to be placed on mitigation but policies are slowly moving to contain more on adaptation. , *Making space for water* specifically points out that long response times in the climate change oceanic systems will mean mitigation has little impact over the next 50 years.
- Specific measures: The Biodiversity Strategy *Working with the grain of nature* commits to a policy of habitat restoration through linking areas, and reinforces the need for strategic, landscape-scale action to deliver this. *PPS9 Biodiversity and geological conservation* urges the use of up-to-date information on environmental characteristics, and a strategic approach to conservation and enhancement. The *Draft se plan* core document promotes the strategic landscape scale for biodiversity improvement, identifying particular areas within the region and recognises the need for habitats and species to move if they are to survive. Networks and habitat creation programmes are other measures promoted; compensatory habitat is proposed in *Making space for water*.
- English national policy on biodiversity and climate change as issued by English Nature recognises the need to act in ways that respond in a dynamic manner to

climate change, and this is illustrated by policy on managed realignment at the coast in circumstances where ‘holding the line’ is recognised as no longer sustainable. The agency has presented guidelines for land managers and biodiversity managers that propose a three-level approach to biodiversity and climate change: site protection, the wider landscape and the level of ecosystem functioning.

2.2 UK territorial/spatial plans

2.2.1 Scope: documents reviewed

Plans and policies made by local (county, district, unitary) authorities, which sit within the South East Regional Spatial Strategy, ie the South East Plan, were reviewed. They included two Structure plans, a sample of 21 Local plans (district level and 4 Unitary local plans. Climate change is less well covered by these plans, the analysis focused principally upon

- Awareness of climate change and impact prediction, and
- Adaptation recommendations

2.2.2 Summary conclusions: Territorial/spatial plans

The review showed how awareness of climate change has grown over the last 3/4 years and the likelihood of inclusion in these plans of climate related measures is dependent on dates of publication.

Policies directed towards the protection of biodiversity (or nature conservation or wildlife) are included in these plans to address many other issues - such as increasing housing and population densities, greater pressures on resources and often these are linked together cumulatively. Where responses to climate change are mentioned this is done in rather broad terms, covering groups of habitat types or landscapes.

Some specific biodiversity enhancement measures mentioned to address these pressures include:

- meeting the aims and targets of UK and Local BAPs;
- creation and management of landscape features to act as ‘stepping stones’;
- ensuring ‘best practicable mitigation/compensation measures’;
- green corridors;
- wildlife corridors and stepping stones;
- consolidation of ecological corridors/networks;
- restoration and enhancement of natural river and wetland elements.

These measures and policies are put forward in response to environmental pressures generally, not only to climate change so they are also included in plans drawn up before climate change was widely recognised as an issue to be addressed. Moreover, the measures may be expected to be implemented with or without climate change impacts.

Where climate change is mentioned there is no precision in forecasting extent and timescales. The time horizons of these spatial plans are generally shorter than that forecast for significant climate change, in that the plans cover 10 – 20 year periods at most. There are occasional references to interactions between natural processes and potential cumulative effects of pressures – climate change is very occasionally included here.

There is no assessment of adaptive capacity of sites or habitats in these plans, and characteristics such as vulnerability, exposure and sensitivity are not discussed.

2.3 UK Environment Agency plans and strategies

2.3.1 Scope: documents reviewed

The Environment Agency has a range of strategies and plans which cover its own activities/assets and those owned or managed by others. Agency responsibilities with principal relevance for biodiversity adaptation are: water resources and quality, flood risk management, and biodiversity (species and habitats). Other Agency roles of potential relevance here may include contaminated land and air quality. Documents reviewed included:

- Flood Risk Management Strategy (incorporating Catchment Flood Management Plans and Water Level Management Plans).
- Water Resources and Catchment Abstraction Management Strategies.
- River Basin Management Plans (RBMPs) RBMPs are required under the Water Framework Directive. They are currently being drafted and will be available in 2008.
- Environment Agency guidance to planners working at regional level (see: Regional Spatial Strategies: Good practice Guidance (Draft) July 2005) and local level (See: Practical guide to influencing Local Development Frameworks and Sustainability Appraisals (published April 2005)).

2.3.2 Summary conclusions: Environment Agency policy

The Environment Agency plans and strategies reviewed here are relatively recent in date, compared with spatial plans, and have environmental protection and biodiversity conservation as important aims. Consequently they demonstrate greater awareness of climate change and its potential impacts than spatial plans currently available, especially with respect to flooding.

The Agency's plans and strategies generally make reference to interactions between natural processes and also identify potential cumulative impacts. Recommendations made for environmental protection which have relevance for climate change impacts are most frequently associated with water level management and wetland restoration as a path to biodiversity enhancement. Implementation measures that work with natural processes are recommended. The Agency is actively pursuing means of communicating policy development on climate change and biodiversity conservation with planners at local and regional levels.

2.4 UK Management plans for designated sites

2.4.1 Scope: documents reviewed

Planning frameworks for designated sites are as shown below. A sample of these plans, schemes and objectives from within South East England were reviewed.

	Plans/objectives
European level Natura 2000 sites ¹	
Special Protection Areas	Management plans (some)
Special Areas of Conservation	Management schemes
National level	
SSSI	Conservation objectives
National parks and AONB	Management plans
National Nature Reserves	Management plans
County/local level	
Local nature reserves	Management plans (some)

¹ Established under 1992 Habitats Directive and 1979 Birds Directive

2.4.2 Summary conclusions: designated site plans

There is an acknowledgement of the likely impacts of climate change in the various management plans reviewed, but the importance accorded is coloured by the date of drafting and responses are influenced by the specific focus of the plan (is it solely concerned with biodiversity, or does it attempt to provide guidance on the integration of competing land uses?) and the size of the site. The range of impacts mentioned includes cumulative impacts, impacts upon natural processes and interactions between impacts.

Adaptation responses outlined for National Parks are, perhaps because of their size and multiple purposes, less specific than for smaller designated sites. The constitution of the management of National Parks and AONBs means that partnership approaches will be recommended.

The timescale of Management Plans vary but these are often designed for relatively long periods (eg 20 years), and are designed to remain valid into periods when climate change may be significant.

2.5 UK Non-statutory plans and strategies for coastal management

2.5.1 Scope: documents reviewed

This section of the review examined non-statutory plans and strategies for coastal management in order to identify those plans that acknowledge climate change and its potential influence on biodiversity. The review specifically sought to identify in the plans and strategies policy initiatives, and other implementation approaches, that addressed climate change and impacts upon biodiversity.

There are a large number of non-statutory plans and strategies for coastal management for the south east, some of them dating back to the early 1970s. The review here has concentrated on

those plans and strategies that have emerged since the mid 1990s and these can be divided into three main groups – coastal protection strategies, wildlife or biodiversity protection/management plans and integrated coastal management plans. The review has shown that many of the coastal protection strategies are related more to the coastal protection of built development than wider concerns.

2.5.2 Summary conclusions: coastal management plans

The review of the non-statutory plans and strategies for coastal management highlighted a number of core issues relating to climate change and biodiversity:

- There is a clear recognition of the interrelationships between socio-economic pressures, biodiversity management and climate change and a general desire to move towards more integrated coastal zone management yet there needs to be much clearer justification for the geographical coverage of such plans – both coastal and in-land;
- The move towards greater partnership and inclusive working in the production of plans leads to compromises and rather vague policies and strategies;
- Climate change is clearly the main driver for the current approach to coastal management plans and strategies, but there seems a rather timid approach to the issue, with many plans not refereeing to climate change, and its likely impacts on biodiversity, directly. There is also a suggestion from many of the plans that much of the work needs to be done whether climate change continues at its current rate or not;
- The uncertainties and time-scales involved in climate change impacts on biodiversity are recognised and this underpins the acceptance of the need for flexibility in approach;
- Biodiversity is a key issue within all recent coastal management documents and yet it largely reflects national policies and legislation towards the protection of designated sites;
- The ability to respond to climate change and its impact on biodiversity is hampered by the weak implementation of non-statutory coastal management plans and implementation is dependent on statutory plans, national policy and legislation.

2.6 Other plans, UK

2.6.1 Scope: documents reviewed

The documents reviewed here included Biodiversity Action Plans (BAPs) with their constituent Habitat Action Plans (HAPs) and Species Action Plans (SAPs) and Coastal Habitat Management Plans (ChaMPs).

2.6.2 Summary conclusions

The message obtained from both BAPs and ChaMPs is mixed. Whilst they acknowledge the potential, and sometimes the actual, impacts of climate change, they do this indirectly rather than directly.

Both BAPs and ChaMPs are wholly reliant upon a habitat or species approach – there is no indication that either is operating at the landscape scale and there is little reference to connectivity as a consequence. This ‘site by site’ approach (or an equivalent eg Habitat Units) effectively means there is no discussion of the area under consideration in terms of its ability to function as an ecological unit, now or into the future.

Coastal management and habitat creation are strong features of CHaMPs, less so for BAPs.

Much more needs to be made of mitigation, avoidance and adaptation in both BAPs and ChaMPs - CHaMPs lend themselves to this much more than BAPs. The proposition for buffer zones is alluded to in CHaMPs, though not in specific reference to climate change.

3 France

3.1 National policy and institutions

The French approach to adapting to climate change is encapsulated in the *Plan climat, 2004*, which states:

‘Adaptation should bring together national policy with local level approaches in order to take into account elements linked to climate in the different decision making mechanisms. In effect, adaptation measures are frequently set in train by people, groups and economic and social players, at different territorial levels, rather than at national level.’

The plan points to an adaptation programme being developed during 2005 by ONERC, the National Observatory on Climate Warming (Observatoire national sur les effets du réchauffement climatique), set up by Parliament to advise on climate change. The ONERC publication *Climate Change Adaptation Strategy* discusses, in very general terms, the need for measures to enable biodiversity to adapt, and refers to research being put in train in collaboration with the French Institute for Biodiversity (IFB)

Institutions with responsibilities relevant to spatial planning and biodiversity are:

MIAT Ministry of the Interior and Spatial Planning (Ministère de l’intérieur et de l’aménagement du territoire) includes :

DATAR: Commission for Spatial Planning and Rural Development (Délégation à l’aménagement du territoire et l’action rurale)

CNADT National Spatial Planning and Development Council (Conseil national d’aménagement et de développement du territoire)

Within the CNADT, the Coastal Commission (Commission Littoral) is currently working on integrated coastal planning

CIADT Inter-ministerial committee for spatial planning and development (Comité interministériel de l’aménagement et du développement du territoire)

The CIADT has a new policy on coastal development, but this does not touch on climate change or sea level rise and very little upon environment - it is mostly concerned with socio-economic issues.

MEDD Ministry for Ecology and Sustainable Development (Ministère d'écologie et du développement durable) <http://www.ecologie.gouv.fr>

GICC Management and Impacts of climate change (Gestion et Impacts des Changements du Climat)

The GICC is managed by MEDD in close collaboration with MIES, the Inter-Ministerial Mission on the Greenhouse Effect (Mission Interministérielle de l'Effet de Serre <http://www.effet-de-serre.gouv.fr>)

DIREN - Direction Regionale de l'Environnement, eg
<http://www.nord-pas-de-calais.ecologie.gouv.fr/v4/scripts/index.asp>

MTETM Ministry for Transport, Infrastructure, Tourism and the Sea (Ministère des Transports, l'Équipement, le Tourisme et la Mer) www.equipement.gouv.fr

3.2 Regional planning

Seven year (previously shorter) regional plans are agreed by the Prefet of each region, the state representative and the President of the Regional Council on actions concerning the planning and development of the region - CPER (Contrat de Plan Etat-Region).

Example: Nord-Pas de Calais: <http://www.cr-npdc.fr/instit/cper/presentation.htm>

Within this Plan for Nord-Pas de Calais, the relevant priority area makes no reference to biodiversity, wildlife or climate change: Priority 12 - Improving the environment and quality of life. No climate change adaptation measures are proposed

Another relevant regional plan is the Regional Plan for environmental protection and natural landscapes - Nord-Pas de Calais. (See :

<http://www.nord-pas-de-calais.environnement.gouv.fr/dc/publications/schemaregionalprotection.pdf>

This plan was published in 1995 and pre-dates climate change awareness.

3.3 Local plans

SAGE Plan for Planning and Management of Water (Schéma d'aménagement et gestion d'eau). The aims and responsibilities of a SAGE are :

- management of water resources and quality;
- management of the natural environment;
- communications and awareness raising;
- leisure and boating activities;
- management of water within industrial areas;
- management of space and control of flows;

Example : SAGE du bassin côtier du Boulonnais (Caps et Marais d'Opale - Capes and Opal Wetland) in Pas de Calais. Approved May 2004. This is the only completed SAGE in Nord-Pas de Calais at present - others are being prepared.

(Full document awaited - summary only on Internet site www.sage-boulonnais.com)

SDAGE Schema Directeur d'aménagement et de Gestion des Eaux (France) The elements required under the WFD to be part of a River Basin Management Plan are to be integrated into the SDAGE for each catchment (this system dates from 1992 Water Law), thus SDAGE will effectively become the equivalent of RBMPs under the WFD.

DTA Spatial Planning strategy (Directive territoriale d'aménagement)

Six plans of this type exist for specific sites in France. Only one is relevant to NW Europe: the DTA for the Seine Estuary (May 2004) prepared by the Prefectures of the two regions, Haut Normandie and Basse Normandie.

<http://www.seine-maritime.pref.gouv.fr/SGAR/site%20DTA/elaboration/index.htm>

After setting out the baseline for the estuary, including state of the environment and risks linked to human activity, the Seine Estuary DTA sets out three objectives:

- 1 To strengthen the port capacity of Normandy whilst respecting the ecological heritage of the estuaries.
- 2 To preserve and promote the natural heritage and landscapes, taking risk into account.
- 3 To strengthen the dynamic of development of the different parts of the area.

There is no mention of climate change, sea level rise or adaptation for these in the document. Amongst the risks mentioned are flooding (especially floods with high sediment load) and cliff erosion. Engineering works are the proposed approach to deal with this.

SCOT Plan for spatial cohesion (Schéma de Cohérence Territoriale)

Under Law L.122-3 on Urbanism and Habitat, limits are placed upon expansion of urban areas. Of relevance here is that a clause in this law restricts development within 15 km of the sea, whether or not a SCOT has been prepared. The motivation for this is reduction of sprawl, rather than as adaptation to climate change.

Other plans may exist for designated areas, such as the Regional National Park Boucles de la Seine Normande. No such plans have yet been identified and reviewed.

PLU Local Development Plan (Plan Local d'Urbanisme) introduced in 2000 is intended progressively replace the **POS** Land Use Plan (Plan d'Occupation des Sols). The PLU is a management tool covering the territory of one or several communes and is aimed at the balancing of urban development with the conservation of natural spaces (including farmland); as well as maintaining the diversity of urban functions and the economic and balanced use of space. The PLU consists of a report, a zoning plan, annexes and a document entitled Management and Sustainable Development Project (**PADD**).

3.4 Conclusions

At this stage it would appear that there is less evidence of planning and preparedness for climate change impacts generally in France than in the UK - though this is probably changing

as a result of extreme weather in 2003 and 2005. The issue of adaptation for biodiversity is only beginning to be explored, at national level.

4 Netherlands

4.1 National policy

4.1.1 Overview

As far as the potential consequences of climate change are concerned the most obvious impacts on The Netherlands and its wildlife are those associated with sea level rise. However, there are other possible effects as well, such as the increased volume of water in its major rivers following the melting of snow and glaciers upstream in Germany, Austria and Switzerland among others. Further consequences could be found in the changes to growing and mating seasons of established flora and fauna, as well as the introduction of new, and disappearance of traditional, crops and other organisms all as a result of increases in average temperatures.

While these are all potential consequences of climate change, the main focus as far as land use planning is concerned appears to be the threat of rising water levels and increased storm activity and the associated risk of flooding.

In The Netherlands the response to the effects of climate change insofar as it concerns land use planning is increasingly characterised by the integration of policies across a wide range of policy spheres and a commitment to flexibility in planning for the future. At the root of this lies the Fifth National Policy Document on Spatial Planning¹⁵ (Nota Ruimte) of 2004 outlining policies on spatial planning until 2020, with extensions through to 2030. This policy document identified the necessity to implement a variety of measures aimed at preventing, and where necessary mitigating, the effects of climate change without sacrificing economic growth and the achievement of necessary residential, commercial, recreational and ecological goals. The Nota Ruimte is therefore an all-encompassing nationwide policy document, leaving more specific policies to be developed through targeted policy documents in partnership with the relevant government departments.

4.1.2 Coastal zone management

A prime example of this is national policy towards coastal zone management. In 2000 the Ministry of Transport, Public Works and Water Management introduced the 3rd Coastal Management Document (Kustnota), which sets out future policies regarding the management of the coastal defences as well as the coastal zone in general. It contains short (<5 years), mid (<30 years) and long (up to a century) term policies, which between them ensure an integrated approach. It follows previous Coastal Plans in 1990 and 1995, and is the first to consider the consequences of rising sea-levels resulting from climate change. The response seems to be a shift in policy towards the development of solutions that incorporate the dynamics of nature, as opposed to previous policies that were primarily aimed at controlling nature.

¹⁵ Vijfde Nota voor de Ruimtelijke Ordening

The publication of *Towards Integrated Coastal Zone Management*¹⁶, produced jointly by four Ministries¹⁷ several provincial governments, water management institutes and local governments, provides further evidence of this integration. However, it is the former publication that will have most impact on land use planning in The Netherlands as its policies will be incorporated into regional and local development plans and other environmental management plans.

4.1.3 National Ecological Network and robust corridors

The National Ecological Network (EHS - Ecologische Hoofdstructuur) was launched by the Dutch government in the 1990 Nature Policy Plan. This was seen as a 'structure of existing nature areas to be made more robust and cohesive (Vos and others, in press) by the development of new nature areas, the enlargement of existing areas and the development of local ecological corridors. Vos and others observe that the NEN was proposed as an answer to habitat loss and fragmentation, considered the prime causes for the perceived loss of biodiversity; the total NEN area is 6 million ha of wet natural sites (including coastal areas). When subsequent evaluation identified a lack of adequate spatial cohesion, the governments of the 12 provinces were asked to explore scope for a set of 'robust corridors'. The following box outlines the thinking of the Ministry of Agriculture, Nature and Food Quality on habitat connection policy.

Connection

Connecting habitats enables or facilitates the exchange of individuals between the individual habitats. In this way the local populations together form a population network. At species level connection zones consist of a system of interconnected natural elements and habitats (stepping stones and key areas), which promotes the exchange of one or more species. connection is desirable particularly in the following situations:

- the landscape in between the habitats is unsuitable: exchange is impeded by barriers or land use,
- the surface area requirements of the species are not met, even when new nature has been created
- the species are hardly or not at all present in the planning area and the change of natural establishment from neighbouring populations is small,
- essential elements of the species' habitat are isolated from one another and are difficult to access.

(source: *Ecological networks: experiences in the Netherlands*. Hootsmans and Kampf for (Ministry of Agriculture, Nature and Food Quality 2004

4.2 Regional and provincial policy

Provincial governments have responded to the policies outlined in the NPDSP and other national policy documents and developed more specific policies for their region. For example, in its Water Management Plan 2006-2010 the Provincial Government of Noord-Holland indicates that it was prompted to draw up this plan in response to the changing requirements of water management due to climate change. It advocates the implementation

¹⁶ Rijksinstituut voor Kust en Zee (2002) Naar Integraal Kustzonebeleid

¹⁷ Ministry of Economic Affairs; Ministry of Transport, Public Works and Water Management; Ministry for Agriculture, Nature Management and Food and Ministry of Housing, Spatial Planning and the Environment

of further defences and control mechanisms to combat the rise in water levels. Other coastal provinces have advocated similar approaches to this issue while inland provinces have also responded, particularly those that have major rivers such as the Rhine and Maas running through their regions.

In areas where ecosystems transcend provincial boundaries such as the Wadden Sea and the Delta region in the southwest provincial governments either have developed or are in the process of developing joint policies to adept to the expected effects of climate change. In both these regions this inter-provincial cooperation extends to cross-boundary policies with regions in the respective neighbouring countries.

A further coordination of coastal policies takes place within individual provinces through Provincial Forums for Coastal Issues¹⁸ (PFCI) (RIKZ 2000). Within these PFCI all three levels of government are represented, but some also include representatives of other interest groups thereby allowing for a more complete balancing of sectoral interests.

4.3 Local policy

Local governments have been actively involved in the development of several of the provincial planning and environmental policy documents indicated above, as they are ultimately responsible for land use planning issues within their area. While they are obliged to incorporate national and provincial policies into their local development plans, and therefore relinquish some control in that sense, it is at this level that specific acceptable land use is determined. This also represents a level of coordination between the different levels of government as local government is responsible for the implementation and enforcement of local development plans, but it is the provincial government that has to approve these plans.

During the consultation for the NSDSP it became apparent that there is a level of confusion regarding the division of responsibilities of the different governmental levels, and this appears to be addressed in the current development of a new Spatial Planning Law due to be implemented in the near future.

5 Overall conclusions

5.1 Acknowledgement of climate change and its consequences

This review of current statutory and non-statutory plans and strategies affecting the natural environment – covering issues for spatial planning, land, biodiversity and water – has demonstrated that in broad terms:

- climate change has only recently been acknowledged in published plans and policies at national level, perhaps over the past three to four years in the UK, whilst in the Netherlands and in France this recognition and design of plan policies appears to have begun more recently;
- in the UK and in the Netherlands acknowledgement by ‘lower’ levels of the spatial planning hierarchy (county, district) currently often refers back to national policies, though in some cases relevant policies have been developed autonomously (eg

¹⁸ Provinciale Overlegorganen voor de Kust

Southampton: energy policy). For resource interests (wildlife, land, and water) national policies are being introduced and there are tentative steps towards recognition of the complex ways in which the web of interests between these bodies and interactions between resources will need to be tackled.

- recognition of the need to address impacts of climate change for biodiversity and is also a recent development – indeed, official acknowledgement of the potential consequences and opportunities of climate change for biodiversity is not yet present in all three countries.

The existence of other pressures upon biodiversity has been recognised across the study area –pressures from human activities including agriculture, transport links, population increase, etc. Measures which assess and address these pressures upon biodiversity may also have value with regards to climate change.

5.2 Some key issues

A number of issues and influencing factors arise, resulting from the uncertainties inherent in this field, the nature of plans and knowledge gaps.

Uncertainties:

- Uncertainty about the appropriate timescale for response to climate change: whether this is a long term issue and response can be delayed until more is known or if steps must be taken now. Many plans and policies relate to a relatively short period (some as short as five years); in comparison with the period over which climate change is currently being forecasted;
- Incomplete understanding of risks associated with climate change and its impacts on biodiversity;
- Uncertainties over the nature and scale of changes and the ways in which direct and indirect impacts may take effect. As a consequence, measures and approaches are described in very broad, generic, even woolly terms to give greater flexibility;
- The cumulative nature of climate change impacts, acting together with other pressures, adds further uncertainty.

Nature of plans and policies

- The responses to climate change included in plans and policies is influenced by factors such as
 - the size of the area affected – and therefore, the degree of precision that can be offered in guidance and recommendations
 - the focus of the plan or policy: is it centred on a particular issue or topic or does it attempt to integrate several topics/land uses/aims?
 - the demands of partnership and inclusive approaches to plan making may be diluting the climate change message as it relates to biodiversity: Issues such as economic development, tourism and land protection still take precedence.

- The range of plans reviewed here includes the statutory and the non-statutory. Weak implementation, particularly of the latter, may reduce effective response, so further tightening of statutory policy may be necessary.
- The boundaries between plans, in terms of both functional and geographic responsibilities of agencies and authorities are not always precise. Responsibility for the coordination of plans and policies to address climate change may be unclear.

Knowledge gaps

- In addition to planned responses to climate change, a natural process of adaptation will also be taking place. How may this be promoted and guided needs to be determined, particularly to remove any obstacles to the process (including policy obstacles).
- It is probable that different habitats and species will have different capacities for adaptation to climate change – very little work has been done on assessing what these differences may be.

5.3 Proposed measures

A range of specific biodiversity maintenance/enhancement measures are mentioned in the various plans, policies and other documents:

- Setting targets for habitats and species.
- Meeting/conforming with the aims and targets of ‘higher level’ or related plans.
- Creation and management of landscape features to act as ‘stepping stones’ or corridors for wildlife.
- Consolidation of networks of corridors.
- Restoration and enhancement of natural watercourses and wetlands as corridors.

These approaches have also often been put forward as a response to other pressures upon wildlife, and may well be implemented with or without climate change though sharper focus on climate change could act as an additional spur to such measures.

Largely absent from policy at this stage are means of assessing and monitoring the effectiveness of any measures introduced. Improvements may also be made in terms of baseline information collection and benchmarking, and an assessment of how any measures might contribute to achieving targets set or policy aims.

There is an important role for leadership in the recognition of what is needed to take forward planning-related adaptation to a changing climate in ways that maintain, enhance and promote biodiversity. Full recognition of consequences and opportunities will lead to decisions being made on what is truly achievable in changed conditions; for example, if conservation objectives which were the basis of site designation are no longer appropriate, how should new objectives be set?

Whilst moves are being made towards appropriate integration of plans (for example, via spatial planning at regional level in the UK, and via Integrated Coastal Management Plans as

is the case in The Netherlands) integration will require further work - in both research and implementation - to provide clarity for planners.

Table 5.1 presents a summary of some of the strengths, and weaknesses of the plan types in general terms for one country (the UK), as well as the opportunities the various types offer and the threats to achieving their potential.

Table 5.1 Summary SWOT analysis - UK

	Strengths	Weaknesses (current)	Opportunities	Threats (future)
National policy and plans	Recognition of climate change and biodiversity issue. Statutory nature	Lack of precision, given need to cover the overall scale	Integration between policy areas	Loss of focus
Spatial plans (regional, county, district level)	Can provide a response framework at different scales.	Reliance on higher level plans and policies, inadequate baselines; Short timescales	Bring national policies to bear locally; Opportunities to operate across scales	Continuing uncertainty on scale of impact; burden of other reform
Environment Agency plans	Close focus on particular issues and locations. Integrating impact of WFD	One size fits all approach to planning	Responsibility for water environment brings opportunities; river/catchment focus permits integration along important corridors	Burden of breadth of responsibilities. Plethora of plans being undertaken.
Site Management plans	Close focus on sites	Will boundaries and conservation objectives remain achievable under a changing climate?	Opportunity to integrate with other plans and partners locally and coordinate responses	Need to integrate many potentially conflicting topics (eg land uses) may mean 'woolly' policies
Non-statutory plans for coastal management	Close focus on sites	Will boundaries and conservation objectives remain achievable under a changing climate?	Opportunity for co-ordination/integration with other plans and partners locally. Focus on coastal strip permits integration of plans and identification of opportunities nearby	Need to integrate many potentially conflicting topics (eg land/coast uses) may mean 'woolly' policies

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Annex 2 EU legislation regarding nature conservation

There are some 200 pieces of EU legislation which have some regard to nature conservation and environmental issues. The following Directives are of greatest relevance to spatial planning and the BRANCH project:

- Birds Directive
- Habitats Directive
- EIA Directive
- Water Framework Directive
- SEA Directive

The following paragraphs give some basic information about the aims of these Directives.

A2.1 The Birds Directive

The Birds Directive (Directive 79/409/EEC on the conservation of wild birds) was the first piece of EU nature conservation legislation. Under the Directive Member States are under a duty to take measures to maintain a sufficient diversity of habitats for all European wild birds and regularly occurring migratory birds. The duty extends to the creation of Special Protection Areas (SPA). Once an SPA has been designated, the Member State must take steps to avoid deterioration of the habitat, or pollution or the disturbance of the birds within it. A second part of the Directive relates to prohibition of activities that directly threaten birds and associated activities such as trading in live or dead birds. A further component of the Directive establishes rules that limit the number of species that can be hunted and the periods during which they can be hunted. There are procedures within the Directive that allow for the granting of consents to authorise activities that would be harmful to habitats and species.

A2.2 The Habitats Directive

The Habitats Directive 92/43/EEC on the Conservation of Natural Habitats and of wild fauna and flora provides for the creation of a Europe wide network of Special Areas of Conservation (SACs), known collectively as Natura 2000. This is to be a coherent ecological network consisting of the sites that meet the criteria provided in Annex I of the Directive and those sites designated as SPAs under the Birds Directive. The second important feature of the Habitats Directive is the introduction, under Article 6(3) and 6(4), of a formal procedure for assessing whether projects or plans, either alone or in combination with other projects or plans, are likely to have a significant effect on a Natura 2000 site. Where significant effects are envisaged, an ‘appropriate assessment’ of the project or plan must be completed. This assessment is a stage by stage consideration of key factors. The first stage is to establish whether the significant effects are adverse in terms of their impact on the integrity of the site. Adverse effects are defined in the European Commission’s guidance document *‘anaging Natura 2000 sites: The Provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC*¹⁹ (MN2000) as being impacts where, following a preliminary assessment, there is a high degree of certainty that the effects are not positive or that the outcome is uncertain. Where predicted impacts are negative or uncertain, the second stage of assessment is for a competent authority to determine whether there is ‘an absence of alternative solutions’. Where no

¹⁹ See <http://europa.eu.int/comm/environment/nature/home.htm>

alternative solutions are identified, the project or plan may only proceed where there are 'Imperative Reasons Of Overriding Public Interest' (IROPI) and where such interests exist and are overriding there must be a consideration of compensatory measures to maintain the overall coherence of the Natura 2000 network.

A2.3 The EIA Directive

The Environmental Impact Assessments (EIA) Directive (85/337/EEC, as amended by Directive 97/11/EC) requires Member States to put into place procedures for the EIA of certain public and private projects, before they are authorised. The aim is to ensure that all projects likely to have significant environmental effects are assessed. The European Commission considers EIA to be one of the key implementation tools for its wider environmental policy and for the achievement of more sustainable development. This is evidenced by the adoption of the Strategic Environmental Assessment Directive (SEA). The links between the various environmental Directives is also made clear by the fact that amending Directive 97/121/EC allows Member States to integrate EIA and Integrated Pollution Prevention and Control (IPPC) procedures and that MN2000, and the methodological guide for appropriate assessments, make strong links between the need for an EIA and the requirements of Article 6(3) and 6(4) of the Habitats Directive.

The EIA Directive places a duty on Member States to make provisions for the completion of an EIA where projects are 'likely to have significant effects on the environment' (Article 2). The Directive provides, in Annex I and Annex II, lists of the projects covered by Article 2. Article 4 (1) of the Directive requires that the projects listed in Annex I are subject to EIA on a mandatory basis. Projects listed in Annex II only require an EIA where there are 'likely' to be significant environmental effects.

All Annex II projects must be screened to determine whether an EIA is required and to facilitate this screening process the Directive provides, at Annex III, a list of criteria that must be taken into consideration during the screening decision. The screening criteria provided by Annex III include:

- characteristics of the project - eg size, use of natural resources etc;
- project locational factors – eg in or near sensitive areas such as wetlands, protected wildlife sites and densely populated areas etc; and
- characteristics of potential impacts – eg extent and magnitude of impact, trans-frontier nature of impact etc.

The Directive provides Member States with a limited amount of discretion to determine the mechanisms used for screening Annex II projects.

Amending Directive 97/11/EC introduced some key changes to the procedures of EIA, including a requirement for project proponents to provide an assessment of any alternatives they have studied, a non-mandatory scoping stage, arrangements for trans-boundary consultation and a requirement to make public screening decisions and the reasons why projects are authorised, together with details of any mitigation measures

A2.4 The Water Framework Directive

The Water Framework Directive (2000/60/EU) is widely considered to be one of the most substantial pieces of EC environmental legislation to date. The Water Framework Directive (WFD) was adopted on 22 December 2000. Member States have three years from that date to transpose it into national law. It places a duty on Member States to ensure that all inland and coastal waters reach 'good status' by 2015. 'Good status' is defined in terms of specific elements of the water environment including surface water, groundwater, ecological and chemical content and quality. The specific status of each element is provided in the Annexes to the Directive. The preamble to the Directive states that the successful implementation of the Directive will rely upon 'close co-operation and coherent action at Community, Member State and local level as well as on information, consultation and involvement of the public, including users'.

A key aim of the WFD is to integrate the management of water quality and water resources and surface and groundwater management in such a way as to meet stated environmental objectives. The Directive is to be implemented in phases with various deadlines for specific activities leading to a final implementation target of December 2015. There are four key duties imposed by the WFD that are to be dealt with in a staged approach over the first nine years of its implementation. These core duties are:

- review of the status of waters within river basin districts from a water management, ecological and economic perspective;
- monitor the status of waters;
- establish water quality and other environmental objectives for river basin districts; and
- establish the measures, or programme of measures, required to achieve these objectives.

The implementation of the Directive and the setting and achievement of water quality and other environmental objectives and targets is to be based on a river basin district²⁰ structure. There is a requirement within the Directive for the linkages between surface and groundwater and water quantity and water quality to be taken into account in meeting objectives. There is also a requirement for the integration of the management of Natura 2000 sites and river basin plans, and moreover, consideration must be given to the water needs of wetlands. Article 13 of the WFD requires the development of management plans for each river basin district - RBMPs.

A2.5 The SEA Directive

The SEA Directive (Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment became effective in July 2004 and experience of its use and provisions is now accumulating. The SEA Directive is designed to help protect the environment and to promote sustainable development. The SEA process it requires involves the prediction, evaluation and mitigation of environmental impacts of statutory plans and certain programmes, thus integrating environmental considerations into decisions at the

²⁰ 'River basin district' means the area of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters, which is identified under Article 3(1) as the main unit for management of river basins.

strategic level, including development plans for municipalities and regions, as well as sectoral plans. The SEA Directive refers to biodiversity both directly and indirectly. It notes, for example, that

The Convention on Biological Diversity requires Parties to integrate as far as possible and as appropriate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans and programmes.

The SEA report prepared under the process is to include an assessment of:

‘The likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage [...] landscape and the interrelationship between the above factors.’ (Annex 1f).

One of the criteria for determining whether or not a plan may have significant environmental effects is if it has ‘effects on areas or landscapes which have a recognised national, Community or international protection status’.

The European Commission published guidance in 2003 on the interpretation of the SEA Directive. See also the following guidance: *Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners* (2004) prepared by SWES, Levett-Therivel and Oxford Brookes University for: Countryside Council for Wales, English Nature, Environment Agency and the Royal Society for the Protection of Birds.

Annex 3 BRANCH policy review workshops and interviews

- Annex 3.1 Winchester October 2005
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 participants
 programme
- Annex 3.2 The Hague December 2005
 analysis
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Annex 3.1 Winchester Workshop

Analysis

The Winchester workshop - held on 11 October 2005 - was the first of the planned workshops within the Branch policy review project. The Winchester workshop brought together planners from the three countries (at a range of levels within the system: national, regional and local) with biodiversity experts, to discuss how the two groups may and should interact to prepare for climate change and adapt planning to be most helpful. This is also seen as an opportunity for networking between participants and for the general discussion of related issues. In order to achieve this, the programme for the day (see Annex 2) consisted of a series of brief presentations followed by three small group/breakout sessions, in order to maximise input from the participants. The full list of prompt questions used in the small group sessions is given in Annex 2, together with participants and practical details of workshop management. The principal themes of the three small group sessions were

- 1 What do we mean by planning for biodiversity change?
- 2 What gets in the way of planning for biodiversity change?
- 3 What is needed to get over these obstacles?

1 What do we mean by planning for biodiversity change?

This first small group session was intended to harmonize an understanding around the tables as to what we would be discussing. The range of relevant plans and strategies with substance (statutory plans) were identified, but the need to integrate these with other forms of spatial planning – for the specific purposes of climate change/biodiversity - was stressed throughout the day. However, the issue of whether or not there is scope to plan adequately for changed biodiversity - given the uncertainties surrounding every aspect of the topic – was debated (uncertainties about biodiversity data, climate change data, migration, other factors/signals, timescales etc.). The issue of the problems of boundaries (the separation of the ‘designated’ from the ‘common’) was mooted, and the impacts and full significance of the Habitats Directive – in particular the potential flexibility or rigidity – was discussed. Whilst more data was seen by some participants as necessary, others questioned this, saying there is some data and we must work with that, rather than devote resources to acquiring other data.

Some initial recommendations emerged from this session: for example the value of capturing and making available ‘case study’ information, such as work on the Wealden small woodlands which may permit a strategic approach locally and guide work elsewhere. Many participants argued that the critical importance of biodiversity and environmental services must be highlighted and tackled across the range of policy areas. However at the same time, clarity is needed for better communication of what the impacts of climate change may be for biodiversity: changing biodiversity is inevitable and preservation is not the way forward. To accommodate change, new measures, new insights and new ways of working, integrating across geographical and policy areas, are needed.

2 What gets in the way of planning for biodiversity change?

Discussion of the obstacles to a process of planning for climate change was lively, with many issues identified. These included ‘short term-ism’, the terminology of the topic, barriers between the players and institutions involved, skills shortages in ecology and planning resulting from changes to the planning system, fear of change, and defined site boundaries.

Obstacles allied to policy include, for example, the difficulties associated with ‘balancing’ the three pillars of sustainable development (social, economic and environmental matters) and the need to elevate the importance of environment. Conflicts between policy aims are seen to exist and are not resolved. Others suggested that whilst policy is becoming clearer on climate change, implementation is still weak; conflicting timescales also present difficulties. Moreover, the wealth of overlapping initiatives, plans and strategies in existence was also seen as an obstacle. These issues can be crystallised as a lack of a clear vision for the future – ‘where we will be’ and ‘where we wish to be’ at a specific future date. Greater precision on and support for policy such as ‘enhancement’ (eg in PPS 9) is needed. It was also recognised that there is already difficulty in providing for compensation sites for biodiversity in Natura 2000 sites affected by development.

The agricultural sector – information from it, links with it, was seen as an area of particular concern, given the importance that open farmland will have as a matrix for the passage of migration/habitat movement. In other sectors, eg water, steps are being taken which align these sectors with biodiversity aims (though human needs may take precedence) although in other sectors (such as transport) this is still not the case.

With regards to the public as a whole, awareness is rising and as climate change is increasingly presented as inescapable, a remaining step must be to inform the public of the impacts of climate change for biodiversity and the need to adapt planning and behaviour.

Questions raised during this session turned on the issue of the multiple-function and multi-use nature of biodiversity sites, and the impacts (adverse and beneficial) that this might have in policy development. The position of developers, and whether or not they faced a ‘level playing field’ of constraints/costs in different locations, was also discussed.

Recommendations and suggestions coming out of this small group session related to policy, the scale of ‘adaptation’ and to measures needed to overcome obstacles. With regards to policy this meant links into the social agenda, integration of planning for different sectors, to reduce conflicts and improve clarity on how ‘enhancement’ might be taken forward. The wish for a larger scale of adaptation was taken to mean both the geographical scale, (to include international relations) and the sectoral scale – encompassing and engaging other sectors of the economy.

More specific measures identified here included clearer consensus on what habitat change might come to mean and the communication of this and the consequent issues to the wider public and other stakeholders: creating political space for awareness and action. Where development is concerned, developers’ contributions may be used to assist – but consistency of approach is needed, and tools such as GIS may have a role to play in helping to compile information for decision-making.

3 What is needed to get over these obstacles?

The final session was intended to prompt ideas for tackling the issues raised in earlier sessions. A number of general points about what must be in place first were mentioned: more recognition of and clarity over what can be expected to result from climate change, in order to underpin policy but also to allow priorities to be established and agreed. This might mean entailing a risk of public alarm, so this must be planned for. Changes in professional mindsets and institutional priorities will be required as part of improved communication on climate change and biodiversity, partly to overcome existing doubts about institutional capabilities. At the same time as clarifying the negative impacts of climate change for biodiversity, more information is needed on where opportunities might lie – the new role of Natural England may be one opportunity here, and ways need to be found of turning the development of sites into an opportunity, as well.

With regards to existing controls affecting special sites, a problematic issue is the degree of change that can be accepted without re-designation or de-designation, but then beyond site boundaries it is suggested that the landscape as a whole is seen as a multifunctional space within which a network of designated sites is set. The process and speed of change will be different in different locations – what will be important is providing space for flexibility – nevertheless, it was noted that latitude for flexibility has been curtailed by past development.

Policy

Recommendations were made with regards to policy, to communication, to practical measures to be taken, tools and training, and areas for further research.

Policy change and development was suggested which would promote joint working between government and other bodies to give a clear steer on how to prioritize and proceed in this area. This would require a declared national vision and harmonized national approach, supported by statement and resources. The vision should make clear what is to be aimed at, given the constraints and opportunities which will result from climate change and recognising the multi-functionality of wildlife areas and links to the breadth of policy sectors. International links and approaches will also be important here, perhaps starting from a reinterpretation of European Nature Directives to move from site-specific approaches towards new means of achieving and maintaining and enhancing biodiversity through the tools available and others to be developed. A broad policy on ‘change’ rather than on a sector (biodiversity, water) might be a way forward.

Part of this wider vision will also entail a re-appreciation of the wider landscape – room to experiment may be found there. An approach which develops anticipatory measures (whilst striving to integrate plans) would also require experimentation.

Communication

A range of suggestions were made about communication in this area, including finding ways of improving understanding/expectations of change and getting people (as ‘public’ and as stakeholders) to accept the likelihood of those changes and helping them to understand why those changes might affect their lives and quality of life. A ‘high level champion’ and a continuing publicity campaign were seen as a possible route to this, but also the provision of a few clear messages, in particular: the need for a permeable landscape and a wide genetic

base for the species present. Also, species and habitats must be expected to move on and to develop/arrive. Such messages need to ‘sell the concept’ and also explain what benefits may be gained from planned adaptation.

For those in the planning sector, guidance on Best Practice based on cases is needed as soon as possible as well as routes to appropriate guidance with respect to the preparation of Local Development Documents (LDDs). Some generic advice may be available from English Nature/Natural England in due course but a need for locally relevant suggestions remains.

In communicating with developers, again some guidance on Best Practice and measures to be included is needed (SPD, etc.) and this would be facilitated by personal and close contact with developers. The farming sector also needs to be engaged and provided with useful guidance and means for linking to sources of information, especially with respect to CAP and agri-environment scheme reforms.

Practical measures

Practical measures for promoting the adaptation of planning to better address climate change were put forward. Some of these describe in generic terms what these measures must be: robust, allowing change not just promoting resilience, action which supports the rhetoric of adaptation, based on priorities which focus work undertaken, guided by other successful existing implementation work – in Europe or elsewhere, measures at the landscape scale (though also more specific measures for brownfield or housing sites), measures that involve better working between the array of government, agency and other bodies and also are designed to give better coordination between initiatives and research. Importantly, these measures should reduce uncertainty.

Further information gathering is suggested: information to improve the evidence base and to assist with integrating plans and strategies. Strategic surveys of sites and land were suggested. It was recognised that much of this information gathering, even if some is undertaken by volunteers, is expensive, and that additional resources (£) will be required to make it happen – the cost of strategic surveys was stressed. More resources are also required for local record centres and work on the value and interest of local sites (eg SINCS) was recommended. Funding via agri-environment schemes (ESAs are being replaced with Higher Level Schemes – HLS) is seen as an important source of funding, but both funding and prescriptions need to be targeted and priority areas identified. Links to other work, eg creation of washlands, need to be established.

Several recommendations concerned BAPs at national and local level. A need is seen to review these and ‘test’ them against climate change, as a means of identifying future potential sites and improving/adapting BAPS for future changes.

The identification and dissemination of best practice cases was proposed. Specific cases mentioned include: RSPB SE Dorset project mapping habitat restoration potential; work on the condition of designated sites, farmland birds and BAP targets in SE England; also, information from Wealden woodlands (<2 ha SNAW); Cuckmere; the River Test, and Oxfordshire flood management. A picture of the development of such sites over time will be useful. An alternative approach: ‘free functioning’ as opposed to site designation, was also highlighted.

Other practical measures that planning could adopt include the integration of green infrastructure into large scale development, the use of GIS to identify habitats suitable for restoration and enhancement, the safeguarding of green corridors within the wider landscape – and linking both remote and urban areas into this network.

Strategic land banking for compensation was mentioned – the scale of this, whether at the European, national or regional level, will require research. Network identification is a practical measure, but the functionality of these networks must be confirmed. It was recognised that more information is needed on how to do this. The impact of compulsory purchase of such land for land prices was debated. ‘Templates’ for appropriate action were suggested, for example with reference to grazing marsh and planned retreat.

Partnerships and fora were also suggested as a useful means of bringing people and institutions together to work on these issues.

Tools and training

A number of tools to support adaptation of planning for biodiversity purposes were mentioned during the session, these included decision-support systems (Hampshire CC, Swansea), and opportunity mapping (using GIS) as a means of identifying suitable areas for biodiversity enhancement. A web-based tool which could incorporate biodiversity and climate change issues was suggested – there have been some advances towards this (eg Kent Lifescapes, the NERC-URGENT Environmental Information System for Planners (EISP²¹)). The Water Framework Directive is seen as having potential as a tool for integrating some aspects of planning for the environment and biodiversity. Sustainability appraisal of plans and a climate change checklist were also mentioned

Further training was proposed for several groups of professionals engaged in work of relevance here: to develop multi-disciplinary capabilities, to enhance understanding of climate change and its impacts, and training in the tools available, such as SEA, appropriate assessment, and other decision-support tools.

Research

Research is seen to be required across a variety of fields. This includes research to establish baselines via strategic and local survey work (some perhaps with the assistance of volunteers/NGOs), research into the impacts of climate change, the identification of potential compensatory sites for future enhancement/translocation work, and to collect information of cross-sectoral relevance, such as water demand. Research is also needed into approaches, eg compensation, planned retreat at coastlines and the likely impact/success of such measures, also to establish the validity of ideas about compulsory purchase or developing the suitability of sites, or identifying and using functional ecological networks.

²¹ Kent Lifescapes: see http://extranet7.kent.gov.uk/website/KLIS_Phase1/contact.html

EISP: see <http://www.planningportal.gov.uk/england/government/en/1108751838308.html> EISP is a prototype demonstrator for decision support for planning decisions involving: land stability, subsidence, flood hazard and nature protection.

Participants - Winchester workshop

Don	Baker	SECCP Planning Sector Group
Ian	Barker	Southampton Unitary
Bryan	Boult	Hampshire CC
Mark	Broadmeadow	Forestry Commission
Claudia	Chambers	English Nature
Gemma	Conway	Solent Forum
Philip	Couchman	Chichester Harbour Conservancy
Alan	Heys	Chichester District Council
Alan	Inder	Hampshire CC
Simon	Marsh	RSPB
Julia	Norman	New Forest District Council
David	Payne	SEERA
Helen	Pontier	Defra, NRRA
Kate	Potter	Environment Agency
David	Pryce-Jones	GOSE
Isabelle	Rauss	Conservatoire du Littoral (France)
Julie	Richards	Southampton Uni /Tyndall Centre
Sabine	Rooij	Alterra (Netherlands)
Stephen	Walker	Environment Agency
Kevin	Watts	Forestry Commission
Hannah	White	Chichester District Council

Project team

Wanda	Fojt	English Nature
Claudia	Chambers	English Nature
Emily	Ball	English Nature
Jake	Piper	Oxford Brookes
Stewart	Thompson	Oxford Brookes
Elizabeth	Wilson	Oxford Brookes

Winchester workshop programme

Tuesday, October 11 9.30 am – 16.30 pm

The Wessex Hotel, Paternoster Row, Winchester, Hants SQ23 9LQ

9.30	Registration, coffee	
10.00	Welcome; overall context of BRANCH Programme for day Aims for the day: <ul style="list-style-type: none"> to identify what planners need from ecologists, etc. future data requirements to move towards identifying planning approaches to address climate change 	WF JP
10.10	Brief presentation on climate scenarios, subsequent impacts and implications of climate change for biodiversity	JP
10.20	The Branch policy review: sources, findings	EW
10.30	How should planners and ecologists, etc. interact to facilitate adaptation? Cases. Contributions from France & Netherlands	ST/ EW
11.00	Coffee	
11.15:	Small group session 1 What do we mean by planning for biodiversity change? What plans, policies, approaches decisions at the local / regional level.	
11.45	Feedback from small group session 1 - plenary	
12.00	Small group session 2 What gets in the way of planning for biodiversity change? Policy obstacles, attitudes, information, what does it mean for us	
13.00	LUNCH	
14.00	Feedback from small group session 2 - plenary	
14.30	Small group session 3 What is needed to get over these obstacles? Examples and ideas	
15.30	Tea/coffee	
15.45	Feedback from session 3 - plenary	
16.15	Key points from the day Branch and future communication	JP WF
16.30	Workshop ends	

A 3.2 Workshop at The Hague

The BRANCH workshop at The Hague was held at the offices of the Dutch Ministry of Agriculture (LNV) on 15 December 2005. Participants came from a range of Dutch central and regional institutions involved in planning. Following short presentations on the BRANCH project, climate change impacts on biodiversity and work by Alterra, a set of issues were discussed to investigate Dutch approaches to planning for climate change and biodiversity. Boxes inserted in the following text give further information on institutions mentioned in the discussions. The list of participants and prompt questions are given at the end of this section.

Present situation

Three ministries have a responsibility for climate change: VROM (Min. for Housing and Spatial Planning and the Environment), LNV (Min. for Agriculture, Nature and Food Quality) and VW (Min. for Transport, Public works and Water Management). A virtual institute combining institutes and ministries is being set up. BSIK is a programme for investment in the knowledge infrastructure (*Besluit Subsidie Investerings Kennisinfrastuctuur*) accountable to VROM. BSIK has 69 participants, including universities, ports, government bodies, ngos, etc. Another research programme is ARK - Space and Climate Adaptation (*Adaptatie Ruimte en Klimaat*). Documents prepared by ARK and BSIK during 2006 will include biodiversity. The ministries are in the process of reviewing their strategies: taking both adaptation and mitigation issues in hand. Climate change now has the attention of the PM.

Reference was made to a forthcoming review of the EU climate change programme, which will take biodiversity into account. A Paper should be presented in November 2006, following a biodiversity meetings in early 2006, a programme-wide meeting in May 2006 and a conference in October 2006.

Awareness

Awareness of climate change is good and improving, but consequences are nevertheless not always accepted - development continues in unsuitable areas. Municipalities are looking for information and guidance from other levels of government, but the water boards have a regulatory role - there are conflicts between these players; the provinces have a greater influence upon the water boards. There is a situation of different players looking to other bodies for a lead.

Establishing priorities is difficult at local level, where development and recreation are seen as vital to economic development (Noordwijk was mentioned as an example).

It was suggested that adaptation strategies are principally developed by countries under pressure on an issue (eg health in France, following summer of 2004). There has not yet been such a trigger in the Netherlands with respect to biodiversity - though there was for flooding. The link between climate change and biodiversity is not yet sufficiently apparent. Despite awareness of climate change, political will to act is not always present - the promotion of development at Gouda - a low-lying, potentially threatened area - was mentioned and deplored.

Water

The issue of water (flooding) and safety is particularly important and a prime driver for action in the Netherlands. Climate change planning can be linked to safety, which will give win-win solutions. There are not yet any specific biodiversity-focussed actions (biodiversity is mainly the responsibility of LNV). The shortage of space in the Netherlands, and its location largely below sea level (over 60% of land) leads to difficulties for planning. Cost is an obstacle and there is continuing need for housing, roads, etc. in the small land area available.

Actions implemented for water and safety also deliver biodiversity benefits. Mention of retention areas (washlands) in Eastern Holland (Heligo?). One participant suggested that biodiversity may be a route to 'selling' appropriate water management practice.

Box A3.1

Ruimte voor Rivier Room for the River (2000) Spatial Planning Key DecisionStrategy)

1 Safety against extreme river floods

Due to anticipated climatic changes the Rhine delta river branches have to accommodate ever-higher extreme discharges. Until recently it was standard policy to raise the crest levels of the dikes to maintain the required level of flood protection. This centuries old policy was abandoned in 2000 in favour of 'Room for the River'. In the new policy, river cross sections are widened by situating the dikes further away from the river, or by lowering the river forelands. This will result in lower flood levels. By the year 2015 the river should be able to safely discharge 16,000 m³/s.

2 Improvement of overall environmental conditions

In giving 'Room for the River', care should be taken not to affect valuable features of landscape, nature and cultural history. More space can also be found by enlarging the river channel within the dikes. In the process, one should aim at a balance between present and foreseeable future spatial requirements, keeping an open eye for every opportunity to enhance safety as well as the master landscaping and the improvement of overall environmental conditions.

source: www.ruimtevoorderivier.nl/index.asp?p_id=420

In inland areas water safety is still an issue near rivers (eg the Meuse-Maas in Limburg). Whilst new wetlands are being created, water management alone will not solve the biodiversity problems of Limburg province.

Development

Within the field of rural development, local entrepreneurs are aware of changing water tables (where function once determined the water table, the reverse is now true). The DLG (Rural development) is starting a project on this - it may be that entrepreneurs will help meet the cost. It was stressed that biodiversity is always a second or third order priority/objective, even if it is integrated into the overriding framework - water is the prime issue.

Corridors and connectivity: EHS/NEN (National Ecological Network)

The connectivity of biodiversity areas across the Netherlands is under pressure from development and climate change. There may be doubts about the correct location of the EHS/NEN but relocation of this network is not politically possible; the EHS/NEN should not be allowed to be the only measure to promote biodiversity in circumstances of climate change.

The issue of responsibility for species protection was discussed - it may be that some species would move out of the Netherlands - would the Netherlands be responsible for 'Dutch' species which move to, say, Germany? However, there is not always an appropriate continuation of the EHS/NEN through neighbouring countries, though discussions are being held on this, and Limburg has held relevant discussions. Translocation of species and habitats for climate change has not yet been considered.

Box A3.2 European Ecological Networks

This Programme Area addresses the ecological interaction between areas of European importance. It contributes to the establishment of a Pan-European Ecological Network (PEEN), and to analysing its linkages to other sectors involved in areas of biological interest, especially land use. The development of this network is based on common objectives adopted by European states, and builds on the implementation of nature conservation instruments in Europe, in particular the EU Natura 2000 network and the Emerald Network under the Bern Convention.

source: http://www.ecnc.nl/EuropeanEcologicalNe/Index_6.html

European Centre for Nature Conservation

Wider landscape/landscape scale approach

There is planning and research work in the Netherlands at the landscape scale with respect to water, but climate change and biodiversity are not taken into account in this activity. Nevertheless, the EHS/NEN is seen as a 'landscape scale' approach.

Efforts to continue defragmentation are also important - again, a link to water and safety is seen as a major way forward.

Natural processes

Some aspects of habitat creation are not very distinct to gardening - an approach working with natural processes would be more appropriate, facilitating the creating of conditions for species, but not necessarily determining what species move in. It is better to acknowledge that biodiversity cannot be planned precisely. A focus on functions provided by ecosystems may be helpful here - though this may determine the type of nature that is encouraged. The importance of dealing with this in the pan-EU context was emphasized. If biodiversity benefits focus on species, then this will be 'mission impossible' - the species protection approach should be abandoned. (The question of whether to protect species resulting from human intervention was discussed briefly).

Obstacles

Obstacles for advance in this area may be: lack of political will, failure to perceive the link between climate change and biodiversity needs, costs of adaptation, pressures upon land resources, pressure for economic development. (The outside contributor also mentioned public attitudes - conservative sensitivity about landscape and nature - as an obstacle to planning for biodiversity). Gaps in information and poor communication between players were also quoted as additional obstacles, and the competing priority of flood defence. Conflicts with agricultural reform grants and promotion of housing/development in floodplains also obstacles - this last is associated with lack of integration between policy levels..

The rigidity of the effects of the Birds and Habitats Directives was also seen as an obstacle - there was some discussion of the continuing responsibility for 'Dutch' species once they passed into, say, Germany.

The issue of uncertainty is an obstacle: there is uncertainty in many aspects of the climate change issue, and resolution of uncertainty is costly. It was suggested that as 100% certainty of prediction is impossible, other means are needed to address uncertainty, rather than continue to expend funds on resolving uncertainty. 'Learn to live with 50% uncertainty'. Informing policy makers about the positive opportunities of climate change was seen (in a written response) as a route to overcoming some policy obstacles.

Additional information needs

It was suggested that a great deal of information is already available, though not necessarily in the appropriate form. What is important may be to re-organise the available data and ensure that it reaches the right desk. Already available are: species distribution data, scenarios of change, spatial planning tools, etc. Municipalities are subject to high costs for delivering information - using consultants - that has been collected with public funding. so what is needed is easier access to information already available. The mapping facility Natuurloket (within LNV) was mentioned - this needs to be strengthened. The information is also available at province level but it should be made more widely available. (It was said that in Limburg such information is made available without charge to NGOs.)

What was requested was climate change information at regional level. Information was also sought on trends in landscapes as a result of climate change.

A lack of fit/integration was seen to exist between targets for nature set at national level in comparison with regional/local levels: the lower levels of the planning hierarchy do not have the ability or see the need to contribute to the national targets. Regional planning scenarios were sought.

Tools needed

Mention was made of visualisation tools, and tools for the interpretation of data. Also, tools which allow for 'creativity' of approaches are sought. People, communications and networks were quoted as important tools for adaptation, and reference was made to local landscape design platforms.

A tool which looks at landscape design, incorporates trends and calculates costs to society of the loss of certain ecosystem functions was seen as necessary. A tool dealing with movement of species is needed.

The approach to be taken must be pan-European, with species and sites considered in an EU context, because of future migration between countries. There needs to be a focus on ecosystem functions, and on 'certain types of nature'. As a general message, a longer time frame needs to be used, making climate change more visible.

Checklists were discussed - there was some agreement that these should not be species checklists, and that developers and planners are already overwhelmed by checklists and procedures to follow. The stages of EIA and the issuing planning permits is important: conditions may be used to bring in required action. The Water Framework Directive will be an important tool for biodiversity planning in future. A Strategy on soil quality, and perhaps, eventually, a Directive on soil quality is expected in the near future.

Communication

The issue of getting the right information to the right individuals/decision-makers was re-emphasized, and the importance of an exchange of information amongst policy makers but involving policy makers not directly working in relation to climate change. Public awareness of climate change is growing and this is a topic in the press and for which there are public campaigns - eg Naturrkalendar, looking at changing phenology. A related issue mentioned was the socio-economic impact of climate change and the difficulty of assessing the value of the contribution of natural systems to the economy and society.

Current and future planning measures for climate change and biodiversity

The usefulness of an EU Directive on climate change was considered - but it was argued that even this might not headline biodiversity and it might have counter-productive effects. The incorporation of climate change across all policy areas - with a Dutch perspective - might be more fruitful. The following set of measures were considered likely to be introduced:

Table A3.1 Some potential future measures (Netherlands)

Measure	Status
Developing new policy on landscapes 'permeable to wildlife'.	In use on national and regional level. Environmental services on all levels still new. Likely future introduction.
Policies on incursion/entry by non-native spp.	In place, but not related to/driven by CC Some projects exist.
Safeguarding sites with potential for dev/restoration as designated sites.	EHS and Natura 2000 areas (also look at surrounding zones, environmental quality: recognition of sensitive areas. Creation of buffer zones. Plans are in place, but not CC motivated. A framework Directive on soils may be prepared (Strategy now under consideration). Soil biodiversity is important as a basis for this.
Developing green corridors/networks.	Yes, at all levels. Continuing future implementation.

Measure	Status
Review of plans for impacts upon biodiversity in circumstances of CC.	No, but possible in the future.
Review of all designated sites for susceptibility/vulnerability to CC impacts.	Not systematically undertaken; maybe in the future; 'early stages, a glimmer'.
Preparedness for re-designation of new sites if conservation objectives are not being met.	Will be in the future - though not welcomed.; within 5 years, when management plans are ready.

Summary of key points

- 1 The status of biodiversity is an issue in the Netherlands, but water and safety are priorities. Whilst linking biodiversity to water issues (particularly: flooding and safety) might ensure it is given more prominence, this might also mean it might be overlooked, as a subsidiary element of any action.
- 2 A good deal of the information needed to take appropriate action is available - what is needed is for this to be more accessible, and available without charge.
- 3 An approach to dealing with the uncertainties surrounding climate change needs to be developed.
- 4 The integration of plans is crucial to managing adaptation of biodiversity to climate change.
- 5 The planning time frame is an issue - longer horizons would be beneficial.
- 6 Good communication between parties and partners is essential.
- 7 New local-regional visualisation tools are needed to help with landscape design under changing climates.

Workshop at the Hague: participants

Arthur Eijs	VROM
Bas Clabbers	LNV
Arthur van Beurden	DLG
Jelle van Minnen	MNP/LED
Bas van Leeuwen	RLG
Herman van Steenwijk	Limburg
Karel van der Sandt	LNV
Project team:	
Jake Piper	Oxford Brookes
Marion Bogers	Alterra
Sabine van Rooij	Alterra

The Hague workshop programme

Thursday, 15 December 2005; 9.00 am - 13.00 pm

9.00	Registration, coffee	
9.30	Welcome; overall context of BRANCH. Aims for the day: <ul style="list-style-type: none"> to identify what planners need from ecologists, etc. future data requirements to move towards identifying planning approaches to address climate change 	JP
9.40	Brief presentation on climate scenarios, subsequent impacts and implications of climate change for biodiversity	JP
9.50	The Branch policy review: sources, findings	JP/EW
10.00	Alterra's work for Branch	SvR
10.10	Discussion group session 1: The present situation	
10.50	Feedback	
11.05	Discussion group session 2: The immediate future - how to change practice	
11.45	Feedback	
12.00	Discussion group session 3 Considering measures and tools	
12.45	Feedback	
13.00	Key points from the day Branch and future communication	JP/ SvR
13.15	Workshop ends	

A 3.3 Brussels workshop

This final workshop was designed to bring the findings of the BRANCH policy review project to the attention of planners and experts working at European level. The workshop was held at South East England House, Brussels, on 19 January 2006.

Discussion and analysis

The workshop programme began with short presentations on the Branch project and on findings from the literature review. An open session following this was designed to discuss: *the Identification of issues*, also: *Commonalities, where do responsibilities and power lie?*

Subsequently work by the Environmental Change Institute was presented, showing how climate change might impact upon biodiversity, demonstrating changes in 'climate space' available to species under different scenarios and at different times. A second discussion group was focussed on: *Priorities and possible solutions and Opportunities*.

The discussions sessions started with a wide ranging discussion of the context of the climate change/spatial planning and biodiversity issues: the historical, spatial and political contexts. Thus issues including likely future and possible future change, the hierarchy of perspectives - including European bioregion perspectives and issues concerned with democracy and equity across Member States and groups within societies. The importance of ecosystem services (or life support functions) was stressed - public appreciation of the value of these functions is low and influenced by access to quality of life. Ways in which behaviour might be changed such as legislation and education - were discussed. Sustainable development might more appropriately be represented by a redesign of the three pillars (social, economic and environment) approach, by a 'nested' concept which makes clear that both society and the economy depend on the environment.

There was discussion of how the climate change and biodiversity issue needs to be integrated into the wider EU policy field, and in particular with regard to agriculture and transport provision. Also, close working with the climate change staff of the EC.

Communication was a theme of the discussion in both sessions: indicators need to be scientifically robust but also have resonance with the public (eg robins). A risk management approach, though adding complexity, is also useful. Visual representations - particularly using maps - were seen as important and scenarios of possible future (for climate, risk, etc.) also have a role.

Aspects of the nature of communication - doom versus opportunity - were weighed - whilst gloom attracts attention the presentation of opportunities is more likely to elicit an active response from politicians, who need to be shown a way forward and what they can hope to achieve.

Visualisation work by the Environmental Change Institute (Pam Berry) was presented and suggestions were made for improving the value of this, eg introducing slope, and soil type. Well-recognised species should be used, from across the Community - existing EU approaches, eg bioregion mapping, should be built upon as they are recognised.

In summary, the morning session's discussion made the following recommendations on what might be done to improve the profile of biodiversity as impacted by climate change and ensure it is given priority:

- a clear set of alternative futures using different scenarios
- a modified approach to action in this field - less process driven and instead emphasizing the possible futures (outcome driven)
- more work on the evidence base on the different mechanisms, especially corridors and networks for biodiversity
- effective integration of biodiversity across all sectors and spatial work, especially agriculture.
- practical case studies showing successful methods and approaches would be very valuable
- working more closely with climate change researchers and policy-makers.

The second discussion session started with an exercise in 'What would heaven and hell in this area look like in 2050, and what would be the steps to getting there?'. Characteristics of hell were seen as including: Policy conflicts; Lisbon agenda having gained supremacy; Incoherent planning; failure to convince the wider public about importance of biodiversity; Fragmentation, no connectivity for biodiversity, no protected areas; Ordinary people having no contact with wildlife - only able to go to 'special' places; waning of EU influence (esp. on global policies), etc.

The characteristics of 'heaven' were seen as: the achievement of the 2010 biodiversity target; Biodiversity loss stopped; Perfect biodiversity indicators (and recognition that biodiversity is the **most important** indicator); Coherent EU legislation; Reduction of the ecological footprint of societies; Wide access to biodiversity for all; Resilient and robust ecological communities; integration of biodiversity with other land uses, etc.

Elements/steps in the process to achieve this 'heaven' were discussed, and included:

- Improving knowledge, data collection and monitoring.
- Moving on from an anthropocentric viewpoint.
- Education and attitude change.
- Full implementation of the precautionary principle.
- Appropriate risk management procedures.
- Further development of compensatory mechanisms.
- Consistent, high quality use of SEA/impact assessment across all sectors (need to define quality and consistent - not just ticking boxes).
- Necessary resources (energy, skills and finance).
- High level leadership (sustainable dev. policy should provide this but is now a 'parallel process').

- Baseline measure of sustainable development for biodiversity.
- Pragmatic approach - even good science alone cannot make decisions.
- Prioritisation within the legislation as resources are restricted.
- A vision of a common environmental objective.

The discussion that followed this touched upon how climate change and biodiversity cross-cut many programmes and therefore a policy matrix indicating consistency is a useful tool. Other tools exist for economic justification of decisions - short-termist, 'silo' thinking must be avoided. The non-monetary argument is also essential.

Participants were asked what their own institutions/departments might best do to assist in promoting the adaptation process for biodiversity and climate change:

- DG Research: Designing a coherent biodiversity research programme (the institutional structure is subject to change, which will affect this).
- DG Environment: Try to (get the message across as far as possible).
- JNCC: Use the democratic route: If the EU were to set up a Sustainable Development Committee then a Council would necessarily evolve from this. This would provide for the sustainability appraisal which could be applied as competition screening now is.
- EEA: To document and share good and bad practice at Member State level. The report *Vulnerability and Adaptation to Climate change in Europe* (Tech report 7/2005) was provided as an example of this, together with EEA Report no. 2/2004 *Impacts of Europe's changing climate*.

Participants were also asked for guidance on case studies to be included within the BRANCH project. Desirable case study characteristics were:

- tackling different levels of the political process International - local, demonstrating the 'administrative quagmire' and the location of competencies.
- A regional case study where 'something is being done well', describing the role of spatial planners in this. (Conflicts between plans and policies were mentioned.)
- Detailed case studies, explaining key reasons for success/failure. What makes spatial planning for biodiversity and climate change work?
- Given that climate change is a minor driver for some effects (eg bird loss), scientific community should indicate the **most sensitive** areas and species
- Similarly, an indication of where adaptation can make the greatest contribution
- Choose ones which show all levels, all issues and ways of solving them. The South East Plan (England) might be a good example to show EU - role of SECCP in influencing Plan to get revised CC policy included; inclusion of landscape-scale biodiversity policies; Sustainability Appraisal; use of RSDF to set objectives to guide RES; cascading down to SEEDA sites eg Queenborough..

Opportunities

Participants were asked to name any forthcoming opportunities that could be exploited to raise the profile of both the issue and the BRANCH project. Responses have been incorporated into Section 8 of the main text.

Summary

Themes from the day, which might lead to actions, were summarized as:

- Integration: using the overarching umbrella of sustainable development.
- Contexts: recognition of the spatial, temporal, scientific contexts and the need for robust decisions (what are our priorities?). Also, the context of societal values and changes in behaviour. Show the value of planning is part of this context, and demonstrating how this benefits us. Need to identify benefits that can be highlighted now (but not in financial terms), as a way of ‘selling’ adaptation via spatial planning.
- Communication: demonstrating good and bad practice at different levels, eg MS, so as to show where policies can be improved “Tell us what you want to see and where changes ought to be made”. BRANCH needs to support its arguments with data and information as a basis for good policies - how far do we do that: spp., communities). Use indicators - and promote use of biodiversity itself as an indicator of development. Identify what the most sensitive indicators are, and the leading indicators (rather than lagging indicators).

Recommendations

(1) Need to improve SD Strategy

- Establish SD Committee to establish an SD Council.
- Then to screen all EU policies – especially other land-extensive policies eg CAP.
- Use Sustainability Appraisal .
- Improve implementation of SEA and EIA Directives.

(2) Consider CC mitigation and adaptation for nature conservation (eg impact of wind-farms – seriously exercising DG Env at present).

(3) Develop indicators including biodiversity and climate change indicators.

(4) Time-scales – ways to raise time-horizon beyond 7-year funding cycle (which DG Regio already considers very long compared with 1 year budgeting cycle).

Final afterthoughts from the participants:

- the need to provide a continual ‘drip feed of information on biodiversity throughout life, capitalizing on the popularity of wildlife and the issues of concern.

- the EC doesn't own territory/biodiversity, therefore has no physical responsibility for it.
- Be aware that ecological network as per Netherlands is very specific to Netherlands and not necessarily appropriate for exporting to rest of Europe.
- Whereas ecological connectivity is important.
- Beware even more silos eg CC policy community is seen as effective because very target-driven (by Kyoto) – but not able to consider wider implications, nor adaptation.

Participants - Brussels workshop

Organisation	Name
DG Evt	Michael O'Briain
DG Env	Jorge Savio, Policy officer - Bio-indicators; Nature and biodiversity section
EEA	Jane Feehan, Biodiversity section
DG Research	Martin Sharman, Head of section: Biodiversity and Ecosystems
DG Regio	Luisa Sanches, Policy analyst: thematic development, Lisbon strategy
JNCC (Brussels)	Hugh Laxton, Head, UK Nature and Landscape Office
JNCC	Jessica Magnus, International Unit
Environmental Change Institute	Pam Berry, Research scientist: Terrestrial ecology and biodiversity (inc. MONARCH projects)
Hampshire CC	Bryan Boulton, Head of Environment futures & sustainability
Hampshire CC	Alan Williams, Principal environment officer
Project team	
English Nature	Wanda Fojt, English Nature Team Manager, Hampshire and IoW
BRANCH	Claudia Chambers, BRANCH programme manager
Oxford Brookes University	Jake Piper, BRANCH Policy Review project manager
	Elizabeth Wilson, Senior Lecturer in Environmental Planning



Final programme - Brussels workshop

Thursday 19 January 2006

Location: South East England House, 35 square de Meeus, Brussels B1000

9.30	Registration, coffee	
9.45	Welcome; and introductions (team and participants) Broad outline of the day and its organisation Aims for the day Overall context of BRANCH, aims of this research	WF/CC
10.15	Presentation of the Branch policy review project so far: (literature review and workshops) Emerging issues for European-level action	EW/JP
10.45	ECI climate change research: visualisation of change	PB
11.00	Coffee	
11.15	Discussion group session 1: Identification of issues and agreement on these Commonalities, where do responsibilities and power lie?	
12.45	Feedback	recorder
13.00	LUNCH	
13.45	Discussion group session 2: Priorities and possible solutions Opportunities	
14.45	(coffee and tea whilst working)	
15.15	Feedback	recorder
15.30	Pulling together the day's discussion; Q & A	WF/AW
15.50	Next steps	CC
16.00	end of meeting	

A 3.4 France: consultation

Introduction

A series of interviews were held during January 2006 to explore French policy and measures relating to climate change. The interviews were based on a semi-structured questionnaire, administered by Dr. Isabelle Rauss of the Conservatoire du Littoral (a BRANCH partner organisation). The questionnaire was devised by Dr. Rauss and the BRANCH team. The following is a translation of Dr. Rauss's summary report of the interviews.

Interviewees

M Atramentovizc (MEDD, D4E, Head of biodiversity projects unit)

V Journe (MEDD, D4E, Head of GICC unit – Climate change management and impacts)

T. Galloo (Coastal Area of the Channel Trust, Technical officer)

H. Lelievre (Chize Centre of Biological Studies, student)

O. Lourdais (Chize Centre for Biological Studies, scientific researcher)

M. Mary (Conservatoire du Littoral, Head of Natura 2000 unit)

S. Renard (Conservatoire du Littoral, Head of Heritage unit).

Other discussions were held with the following, on a less formal basis; responses have been incorporated into the following summary:

Bion, R. (Channel Coastal Areas Trust, coastal warden).

Team manager, Southern Area office: National Office for Hunting and Wildlife.

Summary of findings

Understanding the issue

- Climate change is sometimes seen as news and as a forthcoming catastrophe for biodiversity.
- But the issue is equally frequently replaced at the level of climate and geological changes and seen as a natural change which is nothing merely the evolution of the living world, over which we have little control.
- Much of the time interviewees had difficulty in distinguishing the question of spatial planning for biodiversity and return to the question of 'limiting greenhouse gas effects'.

Existing measures

There are few existing measures for climate change within the field of spatial planning in France.

Examples:

- In certain cases regarding the management of coastal sites, slipways providing access to the sea have been built a short distance from the sea's edge in order to allow for high sea levels.
- Where barriers with a lifetime of 50 years have been installed, these have been set some tens of metres away from the sea in order to allow for rising sea level.
- At present there is no evidence of special policies within the field of land management.

Difficulties

- A major communication problem was acknowledged.
- There is no precise message, no agreement within the scientific or the policy community.
- The information available is contradictory.
- It is difficult to access scientific information (there are no popular accounts; high price of scientific reports).
- Also, there is no very precise knowledge about what will happen with regards to biodiversity.
- There are initiatives studying these questions in place, but this work is still underdeveloped and sporadic (not validated by repeated work), nor is the information brought together centrally for analysis.
- There are doubts about the methods used for assessing impacts.
- For some interviewees it is still too early in France to talk about taking climate change into account within spatial planning as the concept is not yet well understood and remains rather fluid.

How to make progress

- Improve communications on the topic and by using those facts that are known, placing less emphasis on the uncertainties.
- Not taking a 'doom and gloom' approach, rather working with aspects which are closer to daily life.
- It is necessary to prioritize sites and the investment effort to be made there, rather than working on designations.
- Make very practical responses in terms of management – especially along the coast. For example, some sites are likely to disappear – it is not advisable to invest in them.

Scale of planning/legal framework

Generally speaking, the response of interviewees was that it is appropriate to work at the European and the national scales as the policies developed can subsequently be applied at local and regional levels. This action has to be taken, and will not be achieved if policy is not set at a higher policy level.



Research Information Note

English Nature Research Reports, No. 677

Spatial planning for biodiversity in our changing climate

Review and recommendations by Oxford Brookes University for the BRANCH¹ project

J. M. Piper, E.B. Wilson, J. Weston, S. Thompson and J. Glasson

May 2006

Keywords: biodiversity planning, spatial planning, biodiversity protection, climate change, wider landscape, ecosystem function, sites and habitats, corridors, networks, resilience

Introduction

Our changing climate and sea level rise set spatial planners particular challenges for the protection of our biodiversity wealth. We need to understand how we can use spatial planning to allow for change and at the same time meet international and national commitments; protect what is special and what is general and focus on sites as well as landscapes at international, national, regional and local levels. This is particularly the case in SE England and other countries in NW Europe where the climate is likely to change significantly over a short time period and sea levels are rising relatively rapidly.

What was done?

The work focused on assessing the effectiveness of policies and other mechanisms for spatial planning at international (EU), national (France, Netherlands and England), regional and local levels to provide for the protection and enhancement of biodiversity in a changing climate. It provides recommendations, including new tools and mechanisms to improve effectiveness.

A broad selection of policies and spatial plans at all levels was reviewed for each country together with EU environmental legislation, to see how far the likely impact of climate change upon biodiversity was recognised and what measures are being taken to address this.

Stakeholders (planners and policy-makers) were consulted in the partner countries to identify trends in policy and planned measures, and shortcomings in the current process. Case studies of designated and non-designated sites in coastal and inland areas and other initiatives were examined to demonstrate the issues that arise as climate change affects environments valued by wildlife.

¹ This international project is funded through the INTERREG III Community initiative. BRANCH (Biodiversity requires adaptation in Northwest Europe under a changing climate) is led by English Nature in the South East, working with nine partners: Alterra and Province of Limburg in the Netherlands, Conservatoire de l'espace littoral et des rivages lacustres in France, and in England: [Environment Agency](#), [Environmental Change Institute](#), [Hampshire County Council](#), [Kent County Council](#), [Tyndall Centre for Climate Change Research](#) (at both the University of East Anglia and University of Southampton).

Results and conclusions

Awareness of potential climate change impacts upon biodiversity is increasing in all three countries. Specific policy measures to address predicted changes include policies which ensure good functioning of ecosystems as well as promoting greater connection between sites through habitat restoration or biodiversity-friendly land uses.

Shortcomings in the spatial planning process were identified; leadership and guidance are needed with regards to timescales, appraisal tools; implementation powers and more information on appropriate measures and likely success. The recognition of the importance of ecosystems in assisting with adaptation to climate change is an important step. A dynamic and flexible approach is needed, given uncertainties about future change, and the varying needs and dispersal capacities of wildlife species.

Spatial planning measures such as SEA and sustainability appraisal, and river basin management planning offer opportunities for implementing appropriate measures, together with plan integration and climate-proofing, risk assessment and legal agreements with developers.

English Nature's viewpoint

This work is the first known attempt to summarise what is currently available to planners and other decision makers in planning land management, in its widest sense, which will allow our wildlife heritage and inheritance to thrive and develop as climate and sea level change in NW Europe. The use of case studies tests current mechanisms and ideas.

This work takes forward English Nature's climate change agenda into the arena of spatial planning where decisions are made on the ground.

Selected references (all references are included in the main report)

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Further information

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Front cover photographs:
Top left: Using a home-made moth trap.
Peter Wakely/English Nature 17,396
Middle left: Co₂ experiment at Roudsea Wood and Mosses NNR, Lancashire.
Peter Wakely/English Nature 21,792
Bottom left: Radio tracking a hare on Pawlett Hams, Somerset.
Paul Glendell/English Nature 23,020
Main: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.
Paul Glendell/English Nature 24,888



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