



Hampshire County Council

ESPACE Project
Extension Action 1b:

What policies present
barriers to adaptation
in the UK and the
Netherlands?

Final report

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Report for

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What policies present barriers to adaptation in the UK and the Netherlands?

ESPACE Extension project 1b Final report

Introduction and overview

Climate is changing and we need to adapt. Existing policy, especially policy that was developed before there was widespread acknowledgement of the fundamental importance of climate change, can be a barrier to adaptation.

The ESPACE (European Spatial Planning: Adapting to Climate Events) project aims to ensure that adaptation to climate change is recognised and incorporated into spatial planning at all levels. Work on the ESPACE project to date has demonstrated that there are some major obstacles to the delivery of climate change adaptation at the local level. The ESPACE extension project aims to further investigate the obstacles. The work will help to improve understanding of the needs for co-ordination and management within the spatial planning system.

Within this context, this report of Action 1b of the ESPACE project extension presents the results of a transnational review to identify common policies, processes and mechanisms at EU, national, regional/provincial and local levels that hinder implementation of local-level adaptation. This work examined these issues for the UK and the Netherlands.

According to guidance from the UK Climate Impacts Programme (UKCIP)¹, these policy barriers can be termed as *adaptation constraining* policies:

“Climate adaptation constraining decisions lead to actions that limit or constrain the ability of other decision-makers to manage, reduce or otherwise adapt to the consequences of climate change. Such outcomes are called climate maladaptations (IPCC, 2001b). Climate adaptation constraining decisions may be implemented in order to achieve perfectly proper and well-intentioned objectives. However, they have negative consequences for others in terms of the future level of climate risk and its effective management. In order to avoid climate adaptation constraining decisions, decision-makers need to consider the impact that their decisions may have on the ability of their successors, or the ability of other decision-makers with other areas of responsibility, to adapt to future climate change. Hence, climate adaptation

¹ Willows, R.I. and Connell, R.K. (Eds.). (2003). Climate adaptation: Risk, uncertainty and decision-making. UKCIP Technical Report. UKCIP, Oxford.

constraining decisions include the consequences of decisions taken today that restrict the freedom of future decision-makers to manage future climate risks. Climate adaptation constraining decisions can be characterised as examples of unsustainable development or a lack of 'joined-up governance'.... Examples of adaptation constraining decisions include the construction of long-lived assets, such as housing developments, in areas vulnerable to increased risk of fluvial and coastal flooding."

So, adaptation constraining policies are those that make it more difficult for individuals, social systems, built environments or natural environments to cope with the impacts of climate change. Adaptation constraining policies include policies that increase exposure or vulnerability to climate risks, and can be divided into the following categories:

- Policies in one policy area which limit options for adaptation in another.
- Policies that hinder adaptation or increase vulnerability within the same policy area.

To complement the ESPACE project focus, we have concentrated on policy barriers, or adaptation constraining policies, faced by practitioners in the following policy areas:

1. Environment: landscape, soils, biodiversity and waste
2. Flood risk management: coasts, rivers and drainage
3. Land use planning
4. Regeneration and structural funds
5. Water resource management: quantity and quality
6. Emergency planning
7. Climate change mitigation
8. Economics and finance

Where we have uncovered policy barriers that constrain adaptation in other areas we have made brief mention of these as well.

It is clear that recognition of the importance of climate change has grown enormously in the last few years. Policies that were developed before this understanding was in place rarely mention climate change. However, this policy review has shown that many of the more recent policy documents – particularly those in the areas of environment, flood risk management, land use planning and water resources management – are beginning to put climate change centre-stage. Since policy is regularly updated in all spheres, often on a regular basis, and new

policy is always under development, this report necessarily reflects a 'snapshot' of a fast-moving policy landscape.

In this report we are reflecting practitioners' opinions and interpretation of policy, discerned through workshops and meetings with ESPACE partners and additional individuals who are heavily engaged in adaptation. Many of the examples presented here were provided by ESPACE partners. Our approach necessitated consultation with experts and practitioners as a starting point, for three reasons:

- a) The sheer volume of policy documents at EU, national and regional/local level makes it impractical to begin a review without an expert 'steer'. In the areas of the environment and nature conservation alone, there are more than 200 pieces of legislation at the EU level².
- b) We were only able to review Dutch policies when an English summary was available. As a workaround, we held face-to-face meetings to discuss Dutch policy barriers with project partners from VROM and WSRL.
- c) This project aimed to find barriers and gaps, which often involved seeking out the invisible 'things that aren't said' within policy.

We cannot claim to have done a complete analysis in every policy area, and there is varying depth of reportage depending on the knowledge of practitioners about the barriers to adaptation. This varying level of detail is not indicative of the relative importance of the issues raised. We are conscious of the fact that it is relatively easy to identify and criticise the small number of policies that have made a start on climate change adaptation. It is much more challenging to highlight the 'invisible' barriers in the large volume of policy documents that do not explicitly make reference to adaptation – these policies present the really big problems because they are not yet even beginning to take account of climate change risks.

While the scope of this work does not include recommendations for overcoming all the barriers, we offer some pointers in the final conclusions.

Finally, it should be noted that the UK and the Netherlands are both very space-constrained. Long coastlines and rising sea levels add to the pressure on land. This situation is not typical of EU countries, which may therefore limit the applicability of some of the messages in this report for Europe as a whole.

² Piper, J.M., and others. 2006. Spatial planning for biodiversity in our changing climate. English Nature Research Reports, No 677.

Key themes

Theme 1. Barriers of perception and interpretation of policy

Some policies with relevance for adaptation are currently perceived as causing barriers. This may be a question of interpretation and can be challenged. These policies are already interpreted in slightly different ways from place to place and situation to situation.

Nature conservation

Under the **EU Birds Directive**³, Member States are obligated 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. The **EU Habitats Directive**⁴ provides for the creation of a Europe-wide network of Special Areas of Conservation (SACs), known collectively as Natura 2000. This is intended to be a coherent ecological network of sites that meet the criteria provided in Annex I of the Directive and sites designated as SPAs under the Birds Directive. Article 6(2) of the Habitats Directive ensures that appropriate steps are taken to avoid deterioration of habitats and significant disturbance to species. The Habitats Directive also recognises the value of 'stepping stones'.

There is a widely held perception that these two policies presuppose a stable, static environment without taking account of a changing climate's impact on habitats' and species' distributions. For instance, participants at a workshop held as part of the BRANCH (Biodiversity Requires Adaptation in Northwest Europe under a Changing Climate) project⁵, which investigated how spatial planning can help biodiversity adapt to climate change, raised the following concerns about the Habitats Directive⁶:

- *"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."*

³ Directive 79/409/EEC on the conservation of wild birds

⁴ Directive 92/43/EEC on the Conservation of Natural Habitats and of wild fauna and flora

⁵ www.branchproject.org

⁶ Piper et al, *ibid.*

Article 10 of the Habitats Directive requires Member States to endeavour, where they consider it necessary, to encourage the management of landscape features which function as 'stepping stones'. In relation to Article 10, the recommendation of the BRANCH workshop in Brussels is as follows:

"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."

Some believe that the Directive needs to be amended in the light of the need to respond flexibly to changing environments and biodiversity, so that its aims can continue to be met. However, this is a live debate. The European Environmental Bureau states that these:

*"Directives are flexible instruments, which have the capacity to accommodate issues arising from the impacts of climate change on Europe's biodiversity and its conservation, at least for the mid-term future."*⁷

Others agree that the Habitats Directive *is* flexible enough to address climate change, and consider that the inflexibility is a result of how the Directive is interpreted and implemented as 'lines on maps' in national, regional and local policies. The view that the Directive is inflexible often stems from a failure to look carefully at its underlying objectives and how these can be achieved in the face of climate change. The RSPB sought legal advice on the Birds Directive⁸. It wanted a legal opinion on whether the impacts of climate change on wild birds and their habitats could be considered through the instrument of the Birds Directive; and if so, whether the provisions of the Directive were capable of meeting the conservation need to protect and conserve wild birds and their habitats in the context of climate change. The conclusion of their barrister was that the Birds Directive regime includes the necessary flexibility to ensure the conservation of birds and their habitats in relation to climate change.

The BRANCH project final report⁹ recommends that national policy-makers should:

"Review the way the EC Habitats and Birds Directives are interpreted for coasts. It may be more appropriate to maintain stocks of designated habitat or use rolling boundaries to allow natural movement rather than protect static geographically defined areas."

Adaptation of nature conservation policy is discussed further under Theme 5: Dynamic systems, static policies.

⁷ EEB input into EC consultation for Adaptation Green paper: biodiversity and ecosystem services. September 2006. www.eeb.org/activities/biodiversity.

⁸ Climate Change and the EU Birds Directive. A Perspective from The Royal Society for the Protection of Birds. September 2005

⁹ BRANCH partnership (2007), 'Planning for biodiversity in a changing climate – BRANCH project Final Report', Natural England, UK.

Water environment

There are also some commonly-held perceptions that the **Water Framework Directive (WFD)** does not address climate change and therefore presents a barrier to adaptation. The WFD¹⁰ is widely considered to be one of the most substantial pieces of EC environmental legislation to date. It rewrites existing water legislation into a new overarching programme to deliver long-term protection of the water environment and improve the quality of all waters (ground waters and surface waters) and associated wetlands. It places a duty on Member States to ensure that inland and coastal waters reach 'good status' by 2015. 'Good status' is defined in terms of specific elements of the water environment, including chemical, biological and physical measures. This is to be achieved through the implementation of River Basin Management Plans. The Directive makes no reference to climate change, although climate change will affect how 'good status' may be defined for a water body and will bring changes in the physical, chemical and biological characteristics of the water body. The Environment Agency for England and Wales published a position statement¹¹ on the WFD in 2003, which states that:

"Implementation of the Directive will take place in a series of planning cycles. This will allow plans to take into account long-term environmental trends (such as climate change) and improved understanding of basin characteristics."

Since River Basin Management Plans deal with the whole river catchment, they provide an ecosystem-based approach to nature conservation. The need for adaptation action at the ecosystem scale is discussed further in Theme 8.

Environmental Impact Assessment

The **EU Environmental Impact Assessment (EIA) Directive**¹² requires Member States to put in place procedures for the EIA of certain public and private projects, before they are authorised. It aims to ensure that all projects likely to have significant environmental impacts are assessed. The EC considers EIA to be one of the key implementation tools for its wider environmental policy and for the achievement of more sustainable development.

Article 3 of the Directive states that:

"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11, the direct and indirect effects of a project on the following factors:

- *human beings,*
- *fauna and flora;*
- *soil, water, air, climate and the landscape;*
- *material assets and the cultural heritage;*

¹⁰ 2000/60/EU

¹¹ The Water Framework Directive: a position statement. Environment Agency. 2003.

¹² Directive 85/337/EEC as amended by Directive 97/11/EC

- *the interaction between the factors mentioned in the first, second and third indents."*

Information referred to in Article 5(1) of the Directive includes:

"3. A description of the aspects of the environment likely to be significantly affected by the proposed project, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors."

In England and Wales, the Directive was given legal effect through the **Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999**¹³ ('the EIA Regulations') which came into force on 14 March 1999. **Circular 2/99** provides guidance on the Regulations for local planning authorities. In 2007, the UK's Department for Communities and Local Government (DCLG) consulted on proposed amendments to Circular 2/99.¹⁴ Paragraph 87 in the amended Circular is as follows:

"The list of aspects of the environment which might be significantly affected by a project is set out in paragraph 3 of Part I of Schedule 4, and includes human beings; flora; fauna; soil; water; air; climate; landscape; material assets, including architectural and archaeological heritage; and the interaction between any of the foregoing."

Similarly, paragraph 35 in the amended Circular refers to:

"For many types of development, ..., it will be necessary to consider the characteristics of the development in combination with its proposed location in order to identify the potential for interactions between a development and its environment..."

In these paragraphs, and in the paragraphs above extracted from the EIA Directive, the key word is 'interactions': the relationship between a development and its environment is a two-way process. The development can impact on the environment (and the EIA aims to address this), but similarly, the environment can have an impact on the development. The climate system is part of 'the environment'.

Any development with a lifetime of a couple of decades or longer will be affected by climate change. As climate change intensifies, developments that have been designed on the basis of historic climate data may not be able to cope with new climate conditions. If the EIA does not take account of these changes, the development will not perform as intended over its lifetime. In particular, the mitigation (risk management) measures proposed as part of the EIA process may not deliver their intended benefits, and damage to the environment could occur as a result. For instance, changing climate conditions are leading to increased flood

¹³ SI No 293 http://www.legislation.hmso.gov.uk/si/si1995/uksi_19950418_en_1.htm

¹⁴ <http://www.communities.gov.uk/archived/publications/planningandbuilding/amendedcircular>

risks along many coasts and rivers. This means that flood risks to developments located in the vicinity of coasts and rivers are increasing. A flooded industrial site can result in pollution entering watercourses, affecting water quality and downstream ecosystems. Unless the mitigation measures in the EIA for flood risk management on site have taken account of these changing risks, they will fail to perform as intended over the development's lifetime.

When the EIA Directive was developed, the impacts of climate change were not widely recognised and they are therefore not routinely assessed as part of normal practice for the development of EIAs. However, more recently, the **Strategic Environmental Assessment (SEA) Directive**¹⁵ has been developed and became effective in July 2004. It is designed to help protect the environment and to promote sustainable development. The SEA Directive includes very similar wording to the EIA Directive, namely that an SEA report 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).

Since awareness of the impacts of climate change has increased dramatically in recent years, those producing guidance on SEA have interpreted this wording in the SEA Directive as providing the 'hooks' to address climate change adaptation. For instance, guidance on taking account of climate change in the SEA process has been published by the UK Climate Impacts Programme (UKCIP), the Environment Agency and others¹⁶. This suggests that policy does not need to make explicit mention of climate change for it to be a necessary consideration. In this case, the very essence of 'sustainable development' in general is a concept that absorbs management of current and future climate impacts.

In the light of this more recent experience with SEA, and because of growing awareness of climate change, accepted practice for implementing the EIA Directive is beginning to be challenged. The need to address climate change impacts as part of the EIA process has been highlighted recently in the BRANCH project.

As part of the BRANCH project, a report¹⁷ was commissioned which reviewed spatial planning policy relating to biodiversity and climate change. This states that:

"Where development projects are proposed, assessment of environmental impacts must also incorporate consideration of climate change impacts and likely future climates."

Drawing on this report, the BRANCH project final report¹⁸ notes that:

¹⁵ Directive 2001/42/EC

¹⁶ Strategic Environmental Assessment and climate change: Guidance for practitioners. UK Climate Impacts Programme, Environment Agency, Levett–Therivel sustainability consultants and others. 2007. Available from www.ukcip.org.uk/resources/publications/pub_dets.asp?ID=64.

¹⁷ Piper *et al*, *ibid*.

“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.”

It also recommends:

“A risk-management approach that takes into account climate change when making planning decisions, using tools such as Strategic Environmental Assessment of plans and Environmental Impact Assessment of projects.”

An example of where climate change adaptation and biodiversity impacts are being integrated into the EIA process and into master-planning is in the regeneration of Queenborough and Rushenden in Kent, England¹⁹. Queenborough was an important coastal and fishing town, but it experienced economic decline in the twentieth century. Together with nearby Rushenden, Queenborough is the subject of a major regeneration scheme by the South East Economic Development Agency, SEEDA. The emerging master plan aims to highlight the wider landscape qualities of the area (including visual, water space and ecological assets) while allowing natural processes to continue. Green and blue infrastructure has been incorporated in the design, and the scheme plans to expand areas for land and water conservation to enhance biodiversity. Flood risk modelling indicates that flooding in the southern (non-residential) part of the site is likely, but the design erects minimal barriers to water and habitat movements, with a network of permeable ecological spaces, corridors and links.

An approach to the interpretation of existing policy which challenges and extends perceptions of its power and/or competence would be a first step towards ensuring that spatial planning takes account of climate change. If we ‘push’ perceived policy barriers more often, rather than simply following accepted practice, we might be able to better ensure that adaptation to climate change is recognised and incorporated into spatial planning.

¹⁸ BRANCH partnership (2007), ‘Planning for biodiversity in a changing climate – BRANCH project Final Report’, Natural England, UK.

¹⁹ Piper *et al. Ibid.*

Theme 2. Policies not climate-proofed

Many policies do not present a barrier to adaptation *per se*; they simply do not take account of the impacts of climate change and miss the opportunity to incorporate adaptation. They have not been climate-proofed. The problem is a 'lack' of adaptation, rather than a barrier.

Recognition of the need for adaptation to unavoidable climate change is a new and evolving area. So it simply does not feature in many UK and Dutch policies particularly those developed five or more years ago.

Nature conservation

A report²⁰ published in 2006 as part of the BRANCH project reviewed spatial planning policy relating to biodiversity and climate change. In its review of EU policies, the report concludes that:

"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.... 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."

A European Environment Agency report²¹ reaches a similar conclusion: Climate change considerations have not yet been integrated 'to any great extent' into key EU environmental policies.

Spatial development

The **European Spatial Development Perspective** (ESDP)²² was developed to provide coherence and coordination between the spatial development strategies of the Member States while at the same time respecting the principle of subsidiarity. It aims to provide a suitable policy framework for the sectoral policies of the Community and the Member States that have spatial impacts, as well as for regional and local authorities, aimed as it is at achieving a balanced and sustainable development of the European territory. Unlike EU Directives, it has no force in law, which significantly limits its power.

The impacts of climate change are mentioned briefly in the ESDP, under a section entitled '*The changing role and function of rural areas*', as follows:

²⁰ Piper *et al*, *ibid*.

²¹ Vulnerability and adaptation to climate change. EEA Technical Report 7/2005. European Environment Agency 2005.

²² *European Spatial Development Perspective: towards balanced and sustainable development of the territory of the European Union*. Agreed at the Informal Council of Ministers responsible for spatial planning, Potsdam. Luxembourg: Office for Official Publications of the European Communities. CEC. 1999.

“(313) Moreover, climate is a part of the environment, of the natural resources, suffering more than ever from the negative impacts of human activities. Increases of gas responsible for the greenhouse effect, caused by humans, modify temperature and the distribution of rainfall. This leads to shifts of arable areas, endangers flora growth and increases both periodicity and intensity of bad weather.”

However, in terms of challenges for spatial development policy, the ESDP refers only to climate change mitigation policy.

PFI and PPP

PFI (Private Finance Initiatives) and **PPP (Public Private Partnerships)** are increasingly used in the UK to deliver major capital investments like schools, hospitals and transport and waste infrastructure. Through PFI and PPP agreements private companies are contracted to design, build, and in some cases manage new projects. Contracts can typically last for 30 years, during which time the infrastructure or building is leased by a public authority. The PFI/PPP model works well when all risks are identified, assessed and managed, however there is little evidence from published sources that partners in PFI/PPP projects have any appreciation of the risks and opportunities arising from the impacts of a changing climate. PFI/PPP contracts and risk management procedures do not seem to take account of climate change as an issue which needs to be managed. Failure to understand, assess and manage the risks posed by a changing climate could result in construction delays, asset failures, poor performance, customer concerns, increased costs and reduced incomes for the private sector contractor.

Buildings

The **Building Regulations in England and Wales** currently show little evidence of having considered the impacts of climate change. Practitioners consider that they are significantly lagging behind the UK planning system in terms of how they have engaged with the climate issue.

The Building Regulations set standards for the design and construction of buildings to ensure the safety and health for people in or about those buildings. They also include requirements to ensure that fuel and power is conserved (Part L of the Regulations) and that facilities are provided for people, including those with disabilities, to access and move around inside buildings. Some of the obvious areas where the Building Regulations require climate-proofing include:

- Part H on drainage and solid waste: This makes no reference to buildings being resilient to flooding.
- Part L on the conservation of fuel and power puts a strong emphasis on the climate change mitigation agenda, but is likely to lead to increased risks of overheating (See Theme 11 for further details).

In the UK, there is no universally agreed maximum temperature limit for buildings with the exception of schools.²³ This presents obvious overheating risks for buildings not designed to cope with higher temperatures, particularly during sustained periods of hot weather in large city centres where the urban heat island effect is already causing problems. The London Climate Change Partnership considers the lack of overheating standards are a barrier to adaptation²⁴, and recommends that these should be developed to be applicable to homes, workplaces and public facilities, including schools, health and social care premises and public transport.

Agriculture and soils

A further policy area where lack of 'climate-proofing' is evident is UK agricultural policy. Until recently, policy supported intensive farming and did little to encourage farming practices that counter soil erosion, a problem which is expected to be more common under a changing climate. For instance, no-till agriculture can increase soil quality by protecting the soil from erosion and evaporation of water, but it is not encouraged through UK policy. No-till agriculture is widely and effectively practiced in other EU countries, including Belgium.

The UK is currently undergoing major shifts in agricultural policy away from intensive farming. The Rural White Paper for England²⁵ published in 2000 described the government's vision of a new future for farming, the so-called *New Direction for Agriculture*. The White Paper states that "*Farming's main task will still be to produce the food we eat.*" However, it puts a significant new emphasis on the role of farmers as stewards of the environment:

- *"An increasing recognition of the role which farmers and land managers play in maintaining an attractive and diverse countryside and in sustaining the wider rural economy.*
- *Many more farmers will turn a positive approach to the environment to their own economic advantage, with payments for environmental 'goods' that the nation wants - flourishing wildlife, living landscapes, a protected heritage and opportunities for leisure."*

The Rural Strategy 2004²⁶ followed on from the Rural White Paper and set out a new devolved and targeted approach to sustainable development in rural England over three to five years. One of its three priorities is to "*Enhance the value of our countryside.*" Climate change and its interactions with flood risk are cited as 'priority areas for action' under this heading.

²³ CIBSE Technical Memorandum 36.

²⁴ London Climate Change Partnership. 2006. Adapting to climate change: Lessons for London. Greater London Authority, London.

²⁵ Our Countryside: The Future - A Fair Deal for Rural England. 2000. Department for Environment, Food and Rural Affairs.

²⁶ Rural Strategy 2004. Defra, 2004.

The *New Direction for Agriculture* is underpinned by the England Rural Development Programme (ERDP), which aims to help farmers and foresters to become more diverse, flexible and environmentally responsible. Environmental Stewardship is a major new agri-environment scheme under the ERDP which provides financial incentives for land managers (particularly farmers and foresters) to adopt environmentally beneficial land management practices. It distributes about 80% of the expenditure under the draft Rural Development Programme for England, and has three elements:

- Entry Level Stewardship (ELS) which is open to all farmers and landowners
- Organic Entry Level Stewardship (OELS)
- Higher Level Stewardship (HLS).

Each of these elements is supported by a Handbook to be used by farmers wanting to join the scheme and apply for funding. However, despite the recognition in the Rural Strategy 2004 of the importance of climate change, none of these Handbooks makes any reference to it. Having said that, all three of the Handbooks emphasise the need to manage soils appropriately to avoid erosion and run-off. An extract of the guidance is provided below²⁷:

“Soil management

The way in which the land is managed such as timing of cultivation and grazing, choice of crops, types of cultivation and use of hedges and buffer strips, will all effect how much or little run-off and erosion may occur. A soil management plan (see option OMI/EMI) should set out how you will manage the land to reduce the risk of erosion happening in future.

To reduce the risk of run-off and erosion you may wish to consider the following management:

- *Avoid growing certain crops (which are considered high risk due to the nature and timing of their operations) in fields where soil erosion or run-off occurs or is likely to occur (see options OJ1 and OJ2 and EJ1 and EJ2).*
- *Preparing a soil management plan (see option OM1/EM1).*
- *Locating buffer strips in appropriate places (see options OE1 - OE3/EE1 - EE3).*
- *Introducing beetle banks along field contours (see option OF7/EF7)*
- *Cultivating along field contours.”*

A Defra led Review of Progress of Environmental Stewardship, run jointly with Natural England (NE), was launched in May 2007 to look at progress of the scheme. One of the stated reasons for this review is to: *“take account of emerging new policy priorities, in particular in relation to climate change...”* This review will recommend changes to the scheme. It seems likely from the tone of this review that the climate change elements of Environmental Stewardship may be strengthened in the future.

²⁷ <http://www.defra.gov.uk/erdp/schemes/oels/handbook/chapter3-j.htm>

In relation to agricultural policy, it should be noted that, while climate change (e.g. increased precipitation intensity and increased summer drought) will directly affect rates of soil erosion, erosion is much more strongly influenced by land use, i.e. which crops are grown. For instance, forage maize is very susceptible to soil erosion²⁸, since ground cover is slow to develop after sowing, and the soil surface can be poorly protected until mid-summer. Heavy showers can result in surface flow, carrying slurry and soil to watercourses. As maize varieties suitable for the UK climate are developed, UK farmers are increasingly growing the crop for its high protein content, to supplement grass silage and reduce concentrate costs on dairy farms. Interestingly, this increase is partly being driven by higher summer temperatures, which make conditions in the UK more favourable for growing. Furthermore, maize is a biofuel, so climate change mitigation policies that promote increased maize production will increase soil erosion risks²⁹. In contrast, another biofuel crop, oil seed rape is very good at preventing erosion. It covers the ground quickly, and gives near 100% vegetation cover within a month after sowing. It is usually sown in August in the UK and therefore provides good ground cover before October to November (the most significant risk period in southern England).

The EU Commission has adopted an EU strategy and proposal for a framework Directive specifically dedicated to soil protection. The results of the Working Groups set up in preparation for the Strategy clearly identify climate change as a driving force and pressure in soil degradation, though it remains to be seen whether the forthcoming Directive will include guidance on adaptation.³⁰

²⁸ Controlling soil erosion. A manual for the assessment and management of agricultural land at risk of water erosion in lowland England. Defra, 2005.

²⁹ Note that while maize is the prime biofuel crop in the USA, the main crop in Europe is oil seed rape, which accounts for about 80% of biofuel production.

³⁰ Van-Camp. L., Bujarrabal, B., Gentile, A-R., Jones, R.J.A., Montanarella, L., Olazabal, C. and Selvaradjou, S-K. (2004). Reports of the Technical Working Groups Established under the Thematic Strategy for Soil Protection. EUR 21319 EN/6, 872 pp. Office for Official Publications of the European Communities, Luxembourg.

Theme 3. Development in exposed locations

Policies that encourage development in locations that are increasingly highly exposed to climate risks present barriers to adaptation.

Spatial planning and development

Policies that encourage development in inappropriate areas may be storing up adaptation problems for the future. These include areas that are increasingly at risk of flooding or subsidence, dense city centres with urban heat islands that are increasingly at risk during hot weather, and areas where currently-stressed water resources are projected to decrease.

Decisions and policies that constrain adaptation at the large scale tend to concentrate development in areas that are inappropriate from a flood risk or water resources point of view. For example, the policy aim outlined in the South East Plan is to grow the economy of the south east by 3% per year, despite the fact that this region is increasingly vulnerable to high temperatures, flood and drought.

The recent English Planning Policy Statement 25³¹ strongly encourages climate change adaptation and aims to prevent new development in locations that are highly exposed to flood risk:

“5. The aims of planning policy on development and flood risk are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.”

It strongly flags up the impacts of climate change on flood risk:

“2. Climate change over the next few decades is likely to mean milder wetter winters and hotter drier summers in the UK, while sea levels will continue to rise. These factors will lead to increased and new risks of flooding within the lifetime of planned developments.”

It requires Local Planning Authorities (LPAs) when determining planning applications to:

“8... apply the sequential approach (see paras. 14–17) at a site level to minimise risk by directing the most vulnerable development to areas of lowest flood risk, matching vulnerability of land use to flood risk;”

³¹ Planning Policy Statement 25: Development and Flood Risk. Department for Communities and Local Government. December 2006.

However, some feel that the Exception Test within PPS25 allows policy makers to subvert the sequential test for economic reasons:

“The Exception Test

18. If, following application of the Sequential Test in Annex D, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones of lower probability of flooding, the Exception Test can be applied as detailed in paras. D9–D14. The Test provides a method of managing flood risk while still allowing necessary development to occur.

19. The Exception Test is only appropriate for use when there are large areas in Flood Zones 2 and 3, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is necessary for wider sustainable development reasons, taking into account the need to avoid social or economic blight and the need for essential civil infrastructure to remain operational during floods. It may also be appropriate to use it where restrictive national designations such as landscape, heritage and nature conservation designations, eg Areas of Outstanding Natural Beauty (AONBs), Sites of Special Scientific Interest (SSSIs) and World Heritage Sites (WHS), prevent the availability of unconstrained sites in lower risk areas.”

Many of the areas that benefit from EU Structural Funds in the UK are located on the coast, which can result in intensification of coastal/tidal flood risks. There are similar conflicts in the Netherlands, where development is focused on the current economic centre in the West of Holland, despite the fact that it is the lowest point in terms of sea level, and is therefore most vulnerable to flooding, if defences are overwhelmed.

Of course, it is too simplistic to assume that low-lying land is automatically more vulnerable than that at higher elevation. Many other factors can compound or ameliorate flood risk, and new and existing developments can be made less vulnerable through a number of adaptation strategies, including appropriate building techniques. The Dutch planning system provides a framework for climate-proof spatial assessments and vulnerability analyses, including an inventory of possible areas where water storage may be necessary in the long term taking account of climate change.

At a smaller spatial scale, most English planning policy statements focus new development in existing urban areas, although recent initiatives for eco-towns are likely to mean free standing sustainable communities. English planning policy is increasingly risk based, and is starting to include adaptation, but the primary policy drivers are strengthening of existing economic centres, preservation of greenbelt land, and reduction of travel cost and time.

The **Sustainable Communities Plan** for England addresses unparalleled demand for new homes through 'Growth Areas' where housing pressures are greatest, and 'Housing market renewal pathfinders' in areas of housing market collapse. It preceded the publication of PPS25. In addition, a government target in English **Planning Policy Statement 3: Housing**³² requires over 60% of homes to be built on brownfield land.

At the regional level (e.g. South East Plan), the explicit aim is often to create higher density living centres, which offer benefits including shorter travel distances and more viable public transport. Regeneration policy encourages higher densities in urban centres which can exacerbate flash flooding risks and intensification of the urban heat island effect.

In the Netherlands there is no barrier to development on greenfield land, but concentration of existing development is encouraged. Nota Ruimte (the Dutch National Spatial Strategy) explains that "the national government wants to concentrate urbanisation and infrastructure into national urban networks, economic core areas and major transport axes as much as possible"³³. Nota Ruimte also encourages development on brownfield land, and old harbour facilities are not being redeveloped.

Interestingly, land that has not previously been developed in the Netherlands tends to be at lower elevation, and so concentrating new development in existing city centres may be less adaptation-constraining than developing in new areas. The Dutch also see regeneration of city centres as providing opportunities to be more adaptive.

The planning system in England and Wales follows a plan-led system. This involves preparing plans that set out what can be built and where. The plan-led system was updated by an Act of Parliament (the Planning and Compulsory Purchase Act) in December 2004. Under the new law there are two main levels of plan:

- **Regional Spatial Strategies (RSS):** Each Regional Planning Body must prepare a Regional Spatial Strategy. This sets out issues such as how many homes are needed to meet the future needs of people in the region, or whether the region needs a major new piece of infrastructure, such as an airport.
- **Local Development Frameworks (LDF):** Each local planning authority must prepare a Local Development Framework, setting out how the local area may change over the next few years. The LDF must be informed by the directions set by its RSS.

This tiered approach should mean that more strategic decisions can be made at the regional level – for instance, large-scale allocations of land could be reserved for

³² Planning Policy Statement 3: Housing. Department for Communities and Local Government, November 2006.

³³ Nota Ruimte (English summary), Dutch National Spatial Strategy. 2006. VROM.

future flood storage or water resources. In the South East Plan, policy NRM2 identifies major strategic water resource schemes that are of inter-regional significance. The policy requires safeguarding of these sites in Local Development Documents, partly in order to preserve these areas as options for future reservoir sites, and partly to ensure that planning for these schemes is facilitated. In the UK's Thames Estuary, the Environment Agency has identified undeveloped land, suitable for flood storage to cope with climate change, through the TE2100 project. It remains to be seen whether the planning system will ensure this land remains undeveloped until it is required in the future for flood storage. The Thames Gateway, along with many other low lying areas identified for economic regeneration, faces an increasing challenge from sea level rise over this century and beyond. This does not necessarily mean that we should cease development in these areas immediately, but it does set a long-term imperative for change. This change could be managed through temporary planning permission, allowing land use in the interim that would not preclude the longer term need for flood storage.

The UK Government's **Planning White Paper**³⁴ describes the need to address 'the challenges that we face' in planning:

"1.14 The long-term challenges for planning are increasing. Over the coming decades, debate and decisions about where development should take place are likely to become more difficult. We must ensure that the whole planning system, including both the town and country planning system covering residential and commercial development and some infrastructure, and also the range of separate consent regimes for specific types of infrastructure, is fit and able to cope with the following challenges:

- *Meeting the challenge of climate change...*
- *Supporting sustainable economic development...*
- *Increasing the supply of housing...*
- *Protecting and enhancing the environment and natural resources...*
- *Improving our local and national infrastructure...*
- *Maintaining security of energy supply..."*

It aims to make the English planning system more efficient and effective, and includes plans to:

- *"introduce a new impact approach to householder development which will reduce the number of minor applications for planning authorities whilst protecting the interests of neighbours, the wider community and the environment;*
- *extend the impact approach to permitted development to other types of development such as industrial or commercial buildings as appropriate, subject to limitations and conditions;"*

³⁴ Planning for a Sustainable Future. HM Government. May 2007.

It advocates streamlining the planning system by reducing the number of minor applications for planning permission:

“(a) Householder extensions

9.5 Applications for planning permission for minor developments, particularly from householders, are in danger of clogging up the system. From 1995 to 2005 householder applications for planning permission grew by 114 per cent, against growth of less than 8 per cent from all other applications.

9.6 Small scale extensions and improvements to houses often require planning permission, although their impact on neighbours and the surrounding street may be minimal. On the other hand, some developments with adverse impacts on neighbours – for example on their privacy or causing overshadowing – do not need planning permission.

9.7 Our approach to changing the system is based on the work of the Householder Development Consents Review (HDCR) which was set up by the former Office of the Deputy Prime Minister in January 2005. We intend to introduce an approach that assesses the impact on others, to determine what type of householder development is permitted without the need to seek the specific approval of the local planning authority. This is based on the practical approaches currently adopted by local planning authorities when considering applications across the country.

9.8 So a proposal with no or low impact on the area outside the immediate site, for example, in terms of visual amenity or overlooking, would be considered permitted development, that is where planning permission is automatically granted without the need for an application. Conversely, developments considered to have more than a low impact on the wider neighbourhood and/or street scene would require specific planning permission from the local planning authority.

9.9 Overall, these proposals should reduce the number of minor applications for planning authorities to determine and reduce bureaucracy for householders seeking to improve their homes whilst protecting the interests of neighbours, the wider community and the environment.”

This change in policy has the potential to increase vulnerability to a particular, growing source of flash flood risk, namely, the increasing tendency for homeowners to pave over their gardens, leading to reduced infiltration of rainwater into the ground, and increased run-off rates. In urban areas particularly, flash flood risks are a growing concern, and climate change is expected to worsen the situation. By increasing the number of developments not requiring planning permission, the Planning White Paper could lead to more problems in this area. A number of organisations are lobbying the UK Government specifically to exclude paving over of gardens from Permitted Development Rights, on the grounds that they *do* have an impact on the ‘*area outside the immediate site*’ (para 9.8 above). It remains to be seen whether their concerns will be reflected in the Planning Bill in due course.

Theme 4. Remaining in exposed locations

Policies that hinder movement away from locations that are increasingly highly exposed to climate risks, present barriers to adaptation.

Spatial planning and development

The UK planning system is non-interventionist. There is considerable local political reluctance to 'abandon' settlements, mainly because of public opinion which finds abandonment unacceptable. The development of the **North Norfolk Shoreline Management Plan (SMP)** demonstrates these difficulties. The draft SMP was prepared by the engineering consultants, Halcrow, working for North Norfolk District Council (NNDC), Great Yarmouth Borough Council, Waveney District Council, the Environment Agency, English Nature and Great Yarmouth Port Authority. It was issued for consultation in December 2004 and proposed the following³⁵:

- *"Existing defences should be maintained in the short term, where economically viable - effectively no change to current management for the next 20 years. Even with such a policy, it is estimated that about 80 homes and 5 business properties would be claimed by the sea by 2025 (as opposed to more than 200 properties that would be lost in that time under a policy of 'no active intervention')."*
- *In most places, there would be no change in management for the next 50 years.*
- *In the longer term, when a 'hold the line' policy will be neither economically viable nor technically sustainable, a policy of 'managed realignment' should be adopted for many areas. Taking this approach, between 80 and 450 homes could be lost by 2055, and between 450 and 1300 by 2105. Double that number of homes could be expected to be lost under a policy of 'no active intervention'. Under the SMP's preferred approach, around 170 commercial properties are likely to be lost by 2105, whereas between 300 and 550 would likely be lost under a 'no active intervention' policy.*
- *The major centres of population and business - Sheringham, Cromer, Great Yarmouth, Gorleston and Lowestoft - would continue to be defended in the long term (as long as they meet the Government's criteria for funding the defences).*
- *From Eccles to Winterton, where the coastline is managed by the Environment Agency, defences would be maintained for at least the next 50 years while long-term options for the Broads area are investigated."*

A revised version of the SMP, which differs from the Halcrow draft version, was prepared by North Norfolk District Council and has been adopted conditionally. The

³⁵ North Norfolk District Council. 2004. Shoreline Management Plan Consultation Begins. Retrieved from http://www.northnorfolk.org/news/archive2004_5541.asp

revised report highlights some of the Council's concerns and includes the following text³⁶ (key points to note are shown in bold):

"1.1.1 Guiding principles'

*The SMP promotes management policies for a coastline into the 22nd century that achieve long-term objectives without committing to unsustainable defence. **It is, however, recognised that due to present-day objectives and acceptance, wholesale changes to existing management practices may not be appropriate in the very short-term.** Consequently, the SMP provides a timeline for objectives, policy and management changes; i.e. a 'route map' for decision makers to move from the present situation towards the future.*

4.1 PLAN FOR BALANCED SUSTAINABILITY

The SMP is built upon seeking to achieve balanced sustainability, i.e. it considers people, nature, historic and economic realities.

The present-day policies developed for this SMP provide a high degree of compliance with objectives to protect existing communities against flooding and erosion. The long-term Plan promotes greater sustainability of the shoreline and one more in keeping with the natural character of this coast. Because of its limited remit (coastal defence) it cannot and does not seek to address the consequences of coastal change, but does seek to highlight those issues that will need to be addressed.

4.3 MANAGING THE CHANGE

The consequences of the long-term management Plan for this coast should not be understated and in many cases the Plan recommends policies that could be considered socially inequitable without further action. However, the inevitability of necessary change to past policies needs to be recognised. Continued defence, as practised in the past, is unsustainable in the long-term and it is unrealistic to present policies that indicate continued defence of an area where this is unlikely to be sustainable or economically justifiable.

To achieve this change will, however, require consideration of the consequences at various levels of planning and government. There are matters that need to be debated at a national level, as the issues that have been identified by this Plan will exist several times over around the UK. It is not possible to achieve complete sustainability from all perspectives and quite probably national policies will need to be developed to help resolve the dichotomies.

³⁶ Kelling to Lowestoft Ness Shoreline Management Plan. First Review. Amended report. August 2007. North Norfolk District Council.

4.3.1 Recommendations

.....There is currently no obligation on the part of operating authorities or national government to assure protection against flooding or erosion. A condition of the adoption of this Plan must be a change in this approach. Without some form of assistance towards individual, commercial or community losses the policies recommended in this Plan fail to meet many of the Government's five sustainability principles. (www.sustainable-development.gov.uk/what/principles.htm) Consequently where it is desirable to change the policy from Hold the Line to some other policy (other than Advance the Line) then on the North Norfolk frontage this SMP recommends that the existing defences are maintained in a Hold the Line policy until such time as suitable mitigating measures are put in place, including compensation and social justice for individuals and communities. In the absence of the measures the policy will remain unchanged as Hold the Line. It should though be recognised that this approach may itself require review in the face of deteriorating defences and limited resources."

The latest information on the status of the North Norfolk SMP is as follows³⁷:

"The revised Plan has been adopted conditionally by North Norfolk District Council. Full adoption will only take place when the conditions have been met. In summary they are that Government puts in place acceptable measures, including financial support, to mitigate the effects of coastal change and makes it a requirement for a wider economic analysis to be undertaken on those frontages where it is proposed that the defence policy is to change from Hold the Line."

The District Council is currently out to tender for a new SMP which should take better account of social issues.

There has previously been policy to abandon existing settlements. From the 1930s to the 1970s the contraction of the coal mining industry in northern England was followed by development of policies that were used to classify villages for demolition plans. The policies were wide ranging, with 121 villages designated as category 'D', meaning that they were to be abandoned.³⁸ These policies were unpopular with the public, but it could be argued that some communities today are just as 'condemned' or unviable in coming decades.

³⁷ North Norfolk District Council. 2007. Shoreline Management Plan. Retrieved from http://www.northnorfolk.org/coastal/default_5265.asp

³⁸ Pattison, Gary (2004) Planning for decline: the 'D' village of County Durham, UK, in Planning Perspectives, Volume 19, Number 3, pp. 311-332(22)

The UK government is not strictly opposed to compensation for flooded/eroded land. However, there are concerns that compensation payments would deflect funding from proactive risk management.

Theme 5. Dynamic systems, static policies

Policies that deal with dynamic systems in a static way constrain the systems' abilities to adapt.

Coastal zones and nature conservation

A clear example of this barrier is 'coastal squeeze', whereby sea level rise and coastal erosion 'squeezes' habitats between rising seas and hard flood defences, preventing the migration of coastal habitats further inland. English Nature's (now Natural England) Maritime Strategy³⁹ recognises the need to work with dynamic coastal processes where possible, and that this may involve removing hard defences or changing unsustainable management practices.

National policy for coastal zone management in the Netherlands is outlined in the 3rd Coastal Management Plan (Kustnota).⁴⁰ It includes short (<5 years), mid (<30 years) and long (up to a century) term policies. It is the first Dutch coastal management plan to consider the impacts of climate on sea levels and seems to represent a shift in policy towards the development of solutions that recognise dynamic changes on the coast and the need to work with nature, as opposed to earlier policies that were focused on controlling natural processes. Its policies are incorporated into regional and local development plans and other environmental management plans.

The Dutch 'Ecological Main Structure' or 'National Ecological Network' (EHS - Ecologische Hoofdstructuur) was launched by the Dutch government in the 1990 Nature Policy Plan. It provides the 'blueprint' for a Dutch ecological network, and has now been incorporated within Nota Ruimte, the Dutch National Spatial Strategy. The EHS was intended to address habitat loss and fragmentation, and includes existing areas of nature conservation interest, made more robust and cohesive by enlarging existing areas, developing new nature areas, and developing local ecological corridors. The total EHS area is 6 million hectares 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 ecological network set out in the EHS can constrain adaptation when static nature conservation sites no longer provide appropriate habitats for species which have migrated, partly in response to climate change. For example, fresh water must now be transported to some EHS areas in order to preserve their unique character. To complicate matters, some of the EHS network is yet to be developed, and potential sites remain in use as agricultural and even urban land. For these sites to be purchased and incorporated fully into the EHS network spatial planners will

³⁹ Our coasts and seas: making space for people, industry and wildlife. English Nature. 2005. http://www.english-nature.org.uk/science/coasts_and_seas/default.asp

⁴⁰ 3e Kustnota: Traditie, Trends en Toekomst. Ministerie van Verkeer en Waterstaat. 2000.

need to ensure that they will continue to provide nature conservation as the climate changes. The Dutch recognise the need for an ecological structure that changes in response to the climate, and are currently rethinking the EHS.

Forestry

An issue of current debate in the development of climate-adaptive forestry policy and practice relates to the provenance⁴¹ of tree seeds.

Sustainable forest management policies are described in the Helsinki Guidelines⁴². Resolution 1 of the Helsinki Guidelines provides General Guidelines for the Sustainable Management of Forests in Europe. It states (paragraphs 7 and 8) that:

"7. Forest management practices should aim at maintaining and, if possible, improving the stability, vitality, regenerative capacity, resistance and adaptive capacity of forest ecosystems towards stresses..."

"8. In the management of existing forests and the development of new forests, the chosen tree species should be well suited to local conditions and be capable of tolerating climatic and other stresses such as insects and diseases, and potential climatic changes throughout the growing period..."

It is clear that paragraphs 7 and 8 highlight the need for adaptable forest ecosystems and tree species in the face of changing conditions.

Paragraph 9 focuses on the specific issue of provenance and states that:

"Native species and local provenances should be preferred where appropriate".

As a result of the Helsinki Guidelines, use of 'local provenance' stock is also incorporated into UK forestry regulation and practice⁴³. The UK Forestry Standard⁴⁴ encourages the use of local seed stock for planting native species, especially in existing and new native woodlands. The UK Woodland Assurance Scheme also encourages use of local provenance⁴⁵.

These policies, regulations and practices are based on the principle that seeds of local provenance are likely to represent the best-adapted genetic material available for a specific site. However, they were developed before the likely rate and

⁴¹ The term 'provenance' refers to the geographic locality of the trees from which the seed in question was collected. For example, if acorns are gathered from an oak tree growing in France and are planted in England, the resultant trees are of French provenance.

⁴² Guidelines for the Sustainable Management of Forests in Europe. Ministry of Agriculture and Forestry. Finland 1993.

⁴³ Ennos, R., Worrell, R., Arkle, P. and Malcolm, D. Genetic variation and conservation of British native trees and shrubs: Current knowledge and policy implications. Technical Paper 31. Forestry Commission. 2000.

⁴⁴ The UK Forestry Standard: The Government's Approach to Sustainable Forestry. 2nd Edition. 2004.

⁴⁵ UK Woodland Assurance Standard. 2nd Edition. UKWAS Steering Group, Edinburgh. 2006.

magnitude of climate change were fully appreciated. According to a recent paper published by the Forestry Commission⁴⁶, climate change raises the following issues:

“The principle that ‘local is best’ is based on the assumption that natural selection has, over many generations, acted to optimise a population to its local environment. Since its local environment is now likely to change, the question arises of whether local is still best.

Furthermore, there is the question of whether the local population has access to the necessary genetic variation to allow it to adapt to the magnitude of predicted change.

Even if sufficient genetic variation is available, can a population at a site respond fast enough to match the rate of predicted change?”

At a recent European meeting of tree conservation scientists the following key issues were identified in relation to genetic resources and climate change⁴⁷:

1. Genetic diversity has an important role in maintaining the resilience of forest ecosystems to threats associated with climate change, as well as opportunities such as longer growing seasons in the north. Therefore, the first priority is to maintain high levels of within-species diversity across Europe. (Genetic) Conservation Units need to be established.

2. The appropriate use of genetic diversity provides flexibility with respect to forest management and helps to reduce the risks associated with climate change.

3. Widely distributed species in Europe are unlikely to face extinction at the species level but local tree populations are likely to decline, especially at the margins of the distribution ranges.

The recent Forestry Commission paper⁴⁸ draws on this advice and concludes that, in the face of climate change uncertainties, woodland managers should aim for high levels of genetic diversity. The paper goes on to recommend three strategies for achieving this diversity and states:

⁴⁶ Hubbert, J. and Cottrell, J. The role of forest genetic resources in helping British forests respond to climate change. Information Note. Forestry Commission, Edinburgh. June 2007.

⁴⁷ Koskela, J., Buck, A. and Teissier du Cros, E. Eds (2007). Climate change and forest genetic diversity: implications for sustainable forest management in Europe. Biodiversity International, Rome, Italy.

⁴⁸ Hubbert, J. and Cottrell, J., *ibid.*

There is a general need to accept that there is no single answer and that the situation is a dynamic one which requires potentially different approaches through time. The fact that the environment is changing implies that the relationship between current genotypes (i.e. provenances and even species) and the environment is no longer at equilibrium. The use of static concepts, such as seed zones and possibly habitat types, will need to be reviewed to ensure that woodland managers have access to sufficient genetic variation in their planting stock. The British native seed zones system is a valuable tool for labelling and traceability of planting material. However, this relatively fine-scale system of zonation, if rigorously imposed to control the use of planting material, may be overly restrictive in the face of predicted climate change.

Theme 6. Short-termism

Relatively short land use planning horizons present a policy barrier to ambitious long-term plans for adaptation. Perhaps short planning horizons could work well if they were supported by a long term high level direction; working out where we need to be in 50 or 100 years.

Water management

In the Netherlands the planning horizon for coastal management is 200 years, whereas spatial allocation for land use and water storage is made for the next 100 years. Under National Spatial Law, unless the need for water storage space can be justified within ten years, the spatial allocation is lost and the reservation of land must be renewed. This presents an obvious barrier to adaptation, which necessitates planning for longer time periods. It is possible to reserve land for another 10-year period but in most cases the problem is that it is hard to prove that a particular piece of land is needed for flood storage purposes. This is due to the uncertainty which surrounds the specific local impacts of a changing climate.

Nature conservation

Dutch policy has, however, succeeded in gaining longer-term spatial allocations for ecological purposes. To achieve this, the Ministry of Agriculture and Nature specifies an area in hectares which is to be preserved by each province for future need. Provinces then decide the location(s) of the required area. To date, some 50% of this Ecological Main Structure objective has been achieved. The Minister for Agriculture and Nature has the power to use compulsory purchase for spatial allocation, but so far this has not been invoked.

Spatial planning and development

In England, Regional Spatial Strategies provide a broad development strategy for 15-20 years⁴⁹, while Shoreline Management Plans (SMP) tend to look 100 years into the future. Adaptation timescales are out of step with planning horizons, making it difficult to take adaptation on board properly through the planning process. Relatively short land use planning horizons present a policy barrier to ambitious long-term plans for adaptation. Reservoirs, for example, require a very long lead time to build, and it is difficult to claim the need for one in several decades' time within a 10 year planning horizon.

Because of short-termism in planning horizons, land use planning is not taking full account of future climate change risks. Perhaps the most effective way forward is through regular reviews of a long-term (50-100 years, i.e. long enough to consider potential climate impacts) planning 'vision'. Each review would offer an important opportunity for experimentation, learning, reflection and options assessment, while the long-term vision would allow policy-makers to make plans which take account of climate change. As an example of effective use of long-term vision delivered

⁴⁹ Planning Policy Statement 11: Regional Spatial Strategies. 2004. www.communities.gov.uk.

through shorter-term reviews, national policy for coastal zone management in the Netherlands (as discussed under Theme 5 above) includes short, medium and long-term policies.

Theme 7. Inflexibility in the face of climate change uncertainty

Where policy is prescriptive and doesn't allow flexibility to take account of climate change uncertainty, it acts as a barrier to adaptation.

Flood management

Our knowledge of climate change is fast-evolving; new scientific developments are made on a daily basis, and there is still considerable uncertainty about the precise extent of changes in climate variables (temperatures, precipitation, sea level etc.) at different locations. However, policy for local-level implementation of adaptation requires 'hard numbers' – for instance, allowances for future sea level rise. This means that any prescriptive, numbers-based policies run the risk of being quickly out of date with the latest science.

As an example, the Netherlands has developed flood hazard standards for different kinds of land uses based on cost benefit analyses. To take account of climate change, an allowance is made for a 10% increase in rainfall, based on a 'middle' climate change scenario. Though this method provides for some degree of increased protection to cope with a changing climate, the rigidity of the climate change allowance presents a barrier if new scientific findings suggest that a different allowance is needed.

Defra's Project Appraisal Guidance (PAG) notes for flood managers⁵⁰ are also interpreted by some practitioners as an example of this inflexibility. These PAG notes recommend allowances for future regional sea level rise out to 2115 around the coast of England and Wales (net of land movements). The notes also provide indicative sensitivity ranges covering changes in peak rainfall intensity, peak river flow, offshore wind and extreme wave heights. The guidance draws upon the IPCC's Third Assessment report⁵¹, which was published in 2001, and on the UKCIP02 climate change scenarios⁵². However, our knowledge of sea level rise due to climate change is evolving fast. Some of the latest science suggests that sea levels could rise much more rapidly than the IPCC's Fourth Assessment Report figures, and there is a growing body of evidence to support this. For instance, a recent paper connects global sea level rise to global mean surface temperature and estimates 0.5 to 1.4m sea level rise above the 1990 level by 2100 – higher than IPCC AR4 estimates⁵³.

⁵⁰ Flood and Coastal Defence Appraisal Guidance. FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts. October 2006. Defra.

⁵¹ IPCC. 2007. Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Geneva.

⁵² Hulme, M., Jenkins, G.J., Lu, X., Turnpenny, J.R., Mitchell, T.D., Jones, R.G., Lowe, J., Murphy, J.M., Hassell, D., Boorman, P., McDonald, R. and Hill, S. (2002) Climate Change Scenarios for the United Kingdom: The UKCIP02 Scientific Report, Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, UK.

⁵³ Rahmstorf, S., et al., (2007) Recent climate observations compared to projections. Science, 316, 709, doi:10.1126/science.1136843.

Inevitably, prescriptive policy will always be playing 'catch-up' with the latest scientific knowledge on climate change. This situation is unlikely to change for years to come. However, this should not be used as an excuse for failing to address climate change in policy making today. We have sufficiently good information about climate change and its impacts to be able to make robust decisions which take account of climate change uncertainties.

Theme 8. Lack of policy integration and coordination

A sectoral approach to planning can lead to conflict between different areas of policy and makes integration of climate change adaptation with other policy areas difficult. Furthermore, policy-making at different levels (EU, national, regional/provincial and local) can lead to a lack of coordination. Different organisations and responsibilities often work in parallel and are not integrated.

Spatial planning has to reconcile competing demands for the use of land, and achieve compromise. This necessarily means that it is less prescriptive and more strategic. It is therefore open to interpretation and conflict.

The complexity of planning systems and frameworks can cause problems in the Netherlands and in the UK through a lack of integration between the various organisations involved. Each has different priorities and areas of competence and there can be confusion about which legislative or policy driver has primacy, and which are subservient. Where policies have equal status there is potential for confusion and conflict.

Nature conservation

Adaptation of nature conservation policy brings particular challenges in terms of 'vertical' integration. It requires action at three different policy levels⁵⁴:

- 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.

Biodiversity protection at sites alone is not sufficient to ensure successful adaptation. Landscapes need to be 'permeable' to wildlife, so partnerships with a range of authorities, agencies and organisations are required to improve the quality of the wider landscape for nature conservation. Maintaining 'ecosystem function' is important for biodiversity conservation, and also helps to promote functions such as flood risk management and water supply. However, current biodiversity policies do not always recognise these interconnections. **Biodiversity Action Plans** (BAPs) and **Coastal Habitat Management Plans** (CHaMPs) are solely reliant on a habitat or species approach to nature conservation, with no consideration of the landscape scale and little reference to the need for connectivity.

Preventing habitat deterioration requires integration of planning for biodiversity and climate change into policies for:

- development of land and natural resources – for housing, transport, agriculture etc.,

⁵⁴ Piper *et al*, *ibid*.

- management of water resources, water quality and flood risk
- management of soils
- coastal planning.

In the UK, many organisations that control the use of land (e.g. privatised utilities) are not governed by the spatial planning system but by other systems and regulations, designed to address other objectives. This seriously constrains the ability of spatial planning to deliver integrated climate adaptation. Other organisations, including the utilities and their regulators (e.g. OFWAT) have key roles to play in delivering integrated adaptation policy.

Spatial planning

English planning policy is governed by a series of planning policy statements that individually deal with separate topics. Responsibilities for each topic area lie with different organisations, each with its own priorities. This sectoral setup discourages an integrated approach, however the forthcoming Planning Policy Statement on climate change sets out a way for the spatial planning system to create well-adapted communities. In the Netherlands there is also a tendency towards sectoral/silo working. This is not policy, it's "just the way things work". However, the Dutch National Spatial Planning Strategy, *Nota Ruimte*⁵⁵, is a good example of a policy document that tries to integrate policies across a wide range of policy areas. It identifies the need to implement a variety of measures aimed at preventing and managing the effects of climate change whilst maintaining economic growth and achieving residential, commercial, recreational and ecological goals.

Currently, each organisation tends to specialise in the area in which it is expert – fragmented objectives leading to fragmented delivery. Integration of expertise rather than specialisation might facilitate effective adaptation.

As an example, the planning system has a limited impact on water efficiency, so there is a policy gap beyond planning – partially filled by Building Regulations (which do not currently take account of the impacts of climate change – see Theme 2) and Shoreline Management Plans.

Furthermore, in England and Wales, water companies are privatised entities, regulated by OFWAT and the Environment Agency. Under the regulatory system they have a duty to supply water to developments. This does not incentivise them to assist with water conservation, and therefore presents a barrier to adaptation. The Water Act, which extends to England and Wales, does not make metering compulsory, though this would be beneficial from an adaptation point of view. What's more, while they are statutory consultees for Regional Spatial Strategies and Local Development Frameworks, they are not called in if there is a planning inquiry.

Recent changes in the Netherlands mean that provincial governments no longer have a role in checking whether local spatial plans provide adequate space for

⁵⁵ *Nota Ruimte* (English summary), Dutch National Spatial Strategy. 2006. VROM.

water storage. Under the new system, the Water Boards, who make recommendations on water storage, recognise that they now have a bigger responsibility to prove the need for municipal storage since they can no longer rely on the provinces to reinforce their proposals. In a wider context, this change means that the Water Boards must be more prepared to follow legal procedures to back up their recommendations. It also means that Water Boards are keen to build better informal relationships with municipalities, particularly as many water storage decisions are made at the informal spatial planning stages. In an effort to encourage an integrated approach, Water Boards are now training employees to focus on more than water alone, and to recognise the broader economic drivers of spatial planning.

Environmental impact assessment (EIA)

There are some other examples of where policies have been integrated, particularly in the area of EU environmental policy. For instance, the amendment⁵⁶ to the EIA Directive in 1997 allowed Member States to integrate EIA and Integrated Pollution Prevention and Control (IPPC) procedures. Furthermore, the EC's guidance document 'Managing Natura 2000 sites: The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC⁵⁷ (MN2000)⁵⁷ makes strong links between the need for an EIA and the requirements of Article 6(3) and 6(4) of the EU Habitats Directive.

Water environment

The Water Framework Directive (WFD)⁵⁸ provides a further example of integration across a number of policy areas. One of the key aims 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. There is also a requirement for the integration of the management of Natura 2000 sites and river basin plans. Furthermore, 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 – River Basin Management Plans (RBMPs).

⁵⁶ Directive 97/121/EC

⁵⁷ See <http://europa.eu.int/comm/environment/nature/home.htm>

⁵⁸ 2000/60/EU

It is difficult to build adaptation into fragmented (and sometimes conflicting) flood risk management policy and responsibilities, particularly when it is not clear which driver has primacy.

Flood risk and coastal zone management

In 2002 the European Community recognised the need for integrated management in coastal areas and adopted a Recommendation concerning the implementation of **Integrated Coastal Zone Management** (ICZM)⁵⁹. In the same year the UK Government and devolved administrations outlined their intention to manage coastal areas through ICZM.⁶⁰

ICZM encourages sustainable management through coordination of all activities and regulatory functions in and affecting the coastal zone. It means considering the coast and activities on land and at sea in a holistic way, looking at issues in the widest context.

Successful ICZM relies on integration of various levels of governance and coherence of policies affecting the coastal zone.⁶¹ However, ICZM is only a 'communication' – an advisory note with lower status and fewer 'teeth' than other coastal/marine policy.

In England, responsibility for flood risk management is divided across several organisations. The figure and tables below, taken from Select Committee on Environment, Food and Rural Affairs evidence, set out the responsibilities of different organisations⁶². In addition, water companies are responsible for foul water flooding, and can be responsible for surface water flooding. These divisions can lead to a lack of clarity and lack of ownership of problems, as well as conflicts between competing objectives.

⁵⁹ COM/00/547 of 17 Sept. 2000

⁶⁰ A Sea Change: Marine Bill White Paper. March 2007. Defra.

⁶¹ Towards a future Maritime Policy for the Union: A European vision for the oceans and seas. June 2006. EC Green Paper.

⁶² Select Committee on Environment, Food and Rural Affairs, Minutes of Evidence.

<http://www.publications.parliament.uk/pa/cm200102/cmselect/cmenvfru/411/1112812.htm>

Figure 1: Flood defence responsibilities in England

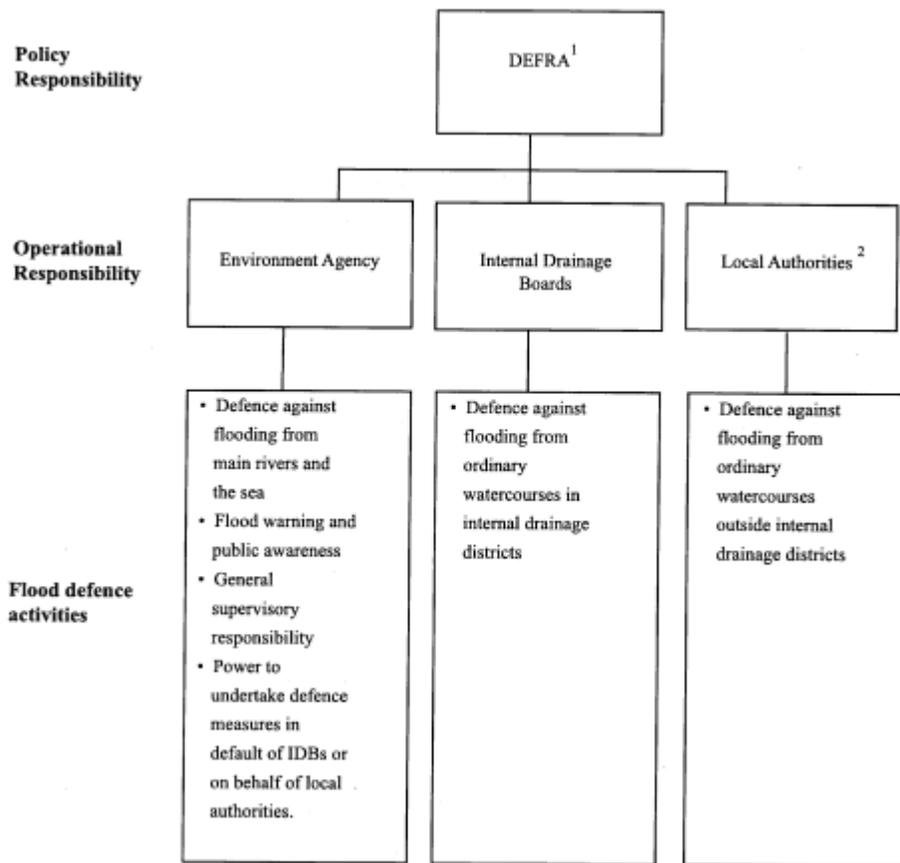


Table 1: Who does what in flood management in England

	Defra	Environment Agency	Internal Drainage Boards	Local Authorities
What we are responsible for	Policy.	Large rivers through cities, towns and agricultural land. Lengths of low lying coastline.	Drains and dykes in low lying areas.	Small drains and dykes in villages and some towns. Lengths of coastline, involving seaside towns and cliff frontages.
What we do	Provide Strategic Guidance.	Maintain, operate and improve flood defences. Provide 24-hour Flood Warning	Maintain, operate and improve flood defences. Emergency	Maintain and improve flood defences. Emergency response.

		service. Emergency response. Supervisory Duty by consent over Local Authorities and Internal Drainage Boards. Report on Government High Level Targets to DEFRA.	response.	Aftercare for flooded areas.
How we are funded	Allocate Grant Aid for improving flood defences and flood warning service.	Funding is raised through Flood Defence Committees, whose majority of representatives are from Local Authorities. It is therefore Local Authority members who have the casting vote on the quantum of investment. Majority of funding is raised through Local Authorities, via Council Tax. Grant Aid from Defra.	Raise money locally through drainage rates. Receive funding from local Authorities and Grant Aid from DEFRA.	Raise money locally through Council Tax for their own flood defence service plus Grant Aid from DEFRA

Consequently, in England there are significant issues in the lack of integration across the different sources of flood risk. The government’s strategy, ‘Making space for water’⁶³ identified a strong need for an integrated approach to deal with flooding problems. This is particularly the case in urban areas where there is currently a complex interaction between different components of the drainage system and fragmented responsibilities. Current institutional arrangements mean that responsibilities for managing stormwater in urban areas are complex and confusing. They lead to inefficient and piecemeal investment decisions overall that could leave urban areas poorly adapted to cope with increasingly intense rainfall events.

Current responsibilities for managing stormwater in urban areas are principally split between local authorities, water companies, the Environment Agency, and Internal Drainage Boards (in drainage districts). These complex arrangements for managing

⁶³Making space for water: taking forward a new Government strategy for flood and coastal erosion risk management in England. March 2005. Department for Environment, Food and Rural Affairs.

stormwater create several kinds of inefficiency in the system and act as barriers to a more sustainable approach. In addition, those responsible for increasing flood risk through development and loss of natural drainage pathways are not bearing the true costs of their actions, as the impacts on flood risk and water pollution are felt further down the drainage catchment.

Defra describes the following problems created by the existing arrangements⁶⁴:

“These complex arrangements for managing stormwater create several kinds of inefficiency in the system and act as barriers to a more sustainable approach. Integration of approaches could occur at several points in the spectrum from planning to delivery.

1. Information. *When customers are flooded from stormwater, they do not know who to contact for help or where to report the incident. Anecdotal evidence suggests that customers can be passed between organisations with no one willing to take responsibility for the water or the incident. There is no single repository or formal reporting of historic flood incidents from stormwater, except perhaps insurance companies, who rarely share this information because it is commercially sensitive. This lack of information reinforces the weak incentive structure within the system.*

2. Risk assessment. *No single organisation has an incentive to carry out a comprehensive assessment of the risks of stormwater flooding or has been given responsibility to do so (compare the Environment Agency’s role in Catchment Flood Management Plans). Individual organisations typically conduct their own independent work on mapping and modelling flood risk in relation to their own assets, with no one taking a strategic or holistic overview. Some local authorities, working with the Environment Agency (statutory consultees), have begun to develop Surface Water Management Plans which integrate drainage provision across local development sites. Water companies, however, are not statutory consultees for individual planning applications (but they are for regional and local development plans) and therefore they are not always involved.*

3. Development planning. *Decisions for new development (properties and infrastructure) are often taken without a full understanding of the risks of stormwater flooding – in part because no one organisation takes responsibility for assessing the effect of the cumulative runoff from new developments (see previous point) and in part because there is no consistent standard or method for mapping surface water. Consideration of new developments on a case-by-case basis can ignore cumulative stormwater effects. The Environment Agency is now a statutory consultee for development and flood risk, but tends to focus on river and coastal flooding issues, since this is where its statutory responsibilities still lie. Water companies are specific consultees for local development plans and regional spatial strategies (not individual planning applications), but are not resourced to contribute pro-actively in the process.*

⁶⁴ Impact assessment on integrated urban drainage (early development of options), Annex B. 2007. Department for Environment, Food and Rural Affairs.

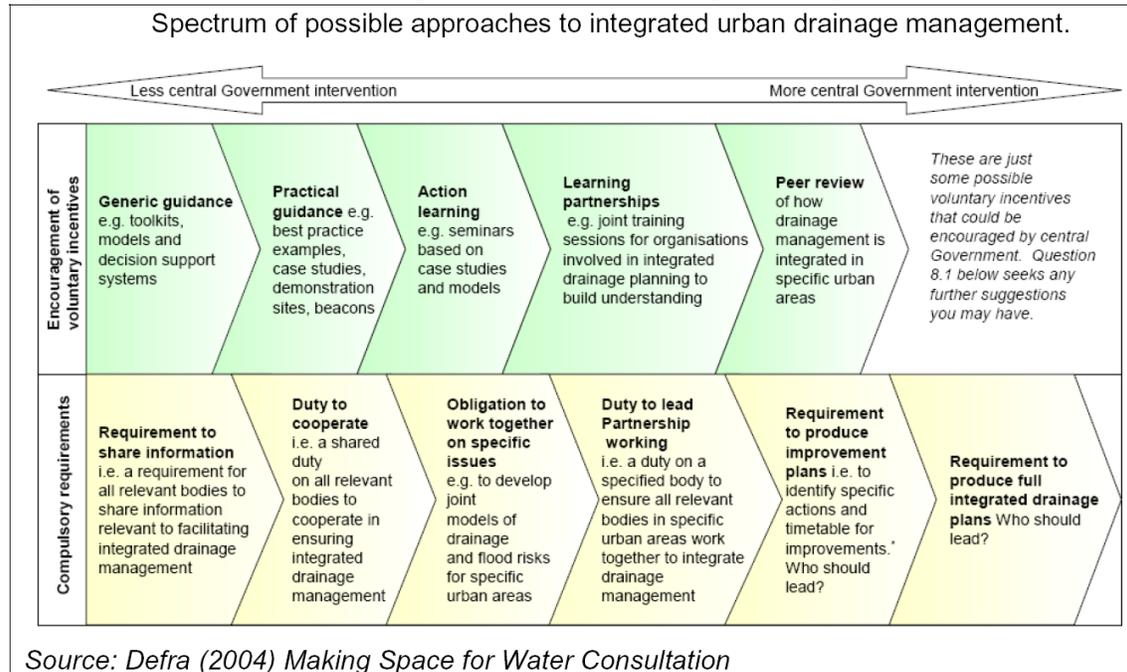
*4. **Investment planning.** As organisations own and manage different parts of the urban drainage infrastructure, they make investment decisions based on a limited cost-benefit analysis that rarely considers the wider drainage issues. The sum total of these individual and piecemeal investment strategies is unlikely to produce the most effective solution. For example, the Ofwat price review process drives water company investment programme towards solving specific sewer flooding problems (typically those with the best cost-benefit ratio). Additional investment may be required to reduce overall flood risk to the community. Once a property has been built, Section 106 of the Water Industry Act (1991) gives the automatic right to connect to the public sewerage system (subject to certain restrictions), so there is little incentive for developers to plan their sites to manage stormwater effectively and responsibly because there is only a one-off adoption charge."*

Defra is currently considering whether the existing legal framework for flood management will be sufficient to ensure that urban drainage systems are effectively adapted to climate change and increasing pressures for development or whether specific legislative changes are needed to bring about a more integrated approach. Defra is currently running 15 pilot studies under the title 'Integrated Urban Drainage' to identify effective ways for partnerships to manage surface water flooding in high risk urban areas, perhaps through 'Surface Water Management Plans'. The spectrum of possible approaches to integration is shown in the figure below.

The lack of coordination of responsibilities for urban drainage has created ambiguity over management and maintenance of Sustainable Drainage Systems (SUDS), making it difficult to implement sustainable drainage. Furthermore, Section 106 of the **Water Industry Act**⁶⁵ concerns the automatic right of a new property to connect to the public sewerage system, with only a one-off adoption charge. This creates an enormous disincentive to manage stormwater effectively on site, through a SUDS scheme.

⁶⁵ Water Industry Act 1991 (cap 56).

Figure 2: Approaches to integrated urban drainage management



In the Netherlands drainage and sewerage is handled by the local authority, surface water is controlled by the water board, and main rivers are managed by Rijkswaterstaat, or National Water Management Institute. Roles are clearly defined and compartmentalised but relationships need managing. The table below sets out the responsibilities of the different levels of government, as outlined in the Water Management Act (Wet op de Waterhuishouding).

Spatial planning in the Netherlands is often described as consisting of three layers:

- The surface layer – which includes water, soil, flora and fauna;
- The network layer – which includes visible and invisible infrastructure; and
- The 'occupation' layer – which is spatial pattern resulting from human use.

Water management plays an important part in each of the three layers, though in the past these were often considered quite separately.⁶⁶ Increasingly, the objective is to involve all three layers for more coherent spatial planning decisions, and to prevent conflicts between users of the same land. This integrated approach can, it is hoped, contribute towards multiple policy objectives simultaneously.

⁶⁶ Spatial planning in the context of nature-oriented flood damage prevention: the spatial planning system of the Netherlands (2006). Haskoning Nederland BV, as part of the INTERREG III B Programme.

Table 2: Who does what in water management in the Netherlands

	Central government – main responsibility is with Ministry of Transport, Public Works and Water Management	Provincial government	Waterboards (Waterschappen)	Local authorities
Responsible for	Strategic national water policy, as well as operational policy for main rivers and the North Sea.	Preparation of a water policy plan, including ground water management, updated every four years.	Operational surface water management, flood protection, water quantity and quality management.	Waste water collection and urban drainage.
Instruments used	Nota Waterhuishouding, Space for Rivers (Ruimte voor de River), Water Policy for the 21 st Century (WB21), Rijkswaterstaat RWS.		The water boards are decentralised public authorities, democratically elected and funded through a water board tax.	Operational sewerage plans and discharge regulations.

Theme 9. Policy primacy

Where one policy area has primacy, it can prevent adaptive action by policy-makers in another policy area.

Conservation of nature, cultural heritage and green belts

The most striking examples of policy primacy occur where conservation is the major objective, for example:

- Nature conservation – EU Directives on Habitats and Birds, local nature conservation designations, designated sites;
- Cultural heritage conservation – designated sites, English Planning and Policy Guidance Note 15: Planning and the Historic Environment (which provides practical guidance on the Listed Buildings and Conservation Areas Act and Ancient Monuments and Archaeological Areas Act). Local Planning Authorities in the UK have a statutory duty to designate and protect locally-important buildings, spaces and sites⁶⁷;
- Green belt conservation – to prevent urban sprawl and preserve openness of green space, policies are set out in English Planning and Policy Guidance Note 2: Green Belts.

It is an often-cited and conventionally accepted fact that nature conservation policy (e.g. EU Directives on Habitats and Birds) and landscape policy have primacy in the UK over all other policies due to stringent tests in the Habitats Directive and their interpretation into UK regulations. While this is beneficial for nature conservation, it can be seen as restricting adaptation from a flood risk management perspective – for example where a flood management strategy might compromise a designated habitat. Similarly, greenbelt conservation policy concentrates development in existing urban areas, exacerbating urban heat island and urban drainage risks, and water resource pressures.

Economy

Another example of policy primacy occurs where economic growth is the major objective. In March 2000, EU governments agreed an ambitious strategy, called the Lisbon Process, of making the EU "*the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion*". In 2001, the European Council adopted the EU Sustainable Development Strategy (the 'Göteborg Strategy') as an integral third dimension to the economic and social facets already established as part of the Lisbon Process.

Since 2001, the Lisbon Process has attracted criticism for a perceived narrowing-down to a focus on competitiveness, economic growth and job creation. Many influential environmental organisations are concerned that the Lisbon Process does not necessarily take account of wider sustainability approaches, and have called for

⁶⁷ Heritage Protection for the 21st Century. 2007. DCMS.

recognition that economic growth, social cohesion, and environmental protection must go hand in hand⁶⁸.

The EC's Green Paper on climate change adaptation mentions the importance of addressing the impacts of climate change in order to secure the benefits of the Lisbon strategy for growth and jobs.⁶⁹ Despite this recognition that adaptation is vital to Europe's competitiveness, there is concern that the Lisbon agenda will continue to focus primarily on growth, at the expense of sustainability (including adaptation) and social cohesion.

At a local level, economic development policy often has primacy, dominating land use planning decisions and overriding other policy considerations, such as the need to address climate change adaptation. For example, Local Planning Authorities (LPAs) feel they must deliver housing above all else, and this primary economic pressure can override flood risk concerns. Further information about this issue is outlined under Theme 3: Development in exposed locations.

Land use planning policy helps decision-makers balance competing demands for space. It is critical to ensure that land use planning does not constrain our ability to adapt to some degree of inevitable climate change.

Emergency planning

While other policy areas have primacy in land-use planning, emergency planning tends to be under-prioritised. Despite the fact that the Civil Contingencies Act identifies compulsory considerations for emergency planning, the Government has no plans to increase local authority funding in this area (where the Local Government Association estimates there to be a £17million shortfall)⁷⁰. Policy requirements in different local authorities are inconsistent – some are very strong on emergency planning, others are not. Some local authorities have never tested their emergency plans.

Emergency planning is the first line of defence when an extreme climatic event (e.g. flood) occurs, and local authorities are responsible for initial emergency response (e.g. sandbags). Despite this, emergency planning is generally under-resourced, and it is very difficult for local authorities to allocate already-stretched funds to low-probability events, leading to the potential for under-preparedness. Some local authorities are beginning to incorporate climate change into existing emergency preparedness plans, however. Hampshire County Council, for example, accepts that the Civil Contingencies Act imposes a statutory duty to prevent emergencies from occurring as far as reasonably practicable. The Council advocates factoring in the impacts of climate change into both Corporate and Community Risk Registers to ensure that climate risks are addressed.

⁶⁸ 'Could Try Harder': A mid-term report on the European Commission's environmental record. 2007. Green 10.

⁶⁹ Adapting to climate change in Europe – options for EU action. Green Paper. June 2007. Commission of the European Communities.

⁷⁰ Hoult, Ian. (2004) Recent media interest in the Emergency Planning Society. In Blueprint, Issue 37.

A recent report from the London Climate Change Partnership⁷¹ recommends that Civil Risk Registers be changed to ensure they adequately reflect the risk of heat waves. Emergency services and others have focused on flood risk but have largely ignored heat risks (until the 2003 summer heat wave). The report recommends the following measures:

- *“London’s homeless population is a high risk group and Primary Care Trusts (PCTs) in London should specifically address their needs in their heatwave plan.*
- *‘Cool centres (air-conditioned public buildings) should be provided during heatwaves, with extended opening hours for vulnerable people. Local Authorities should work with other public bodies including health care providers to plan ‘cool centres’ for London and include them in emergency plans.*
- *Local authorities and PCTs should consider setting up a ‘buddy system’ for vulnerable people.*
- *Guidelines should be developed for the appropriate care of vulnerable individuals during heatwaves in health and social care institutions, and perhaps legally enforced (as part of homes registration).*
- *Risk assessment for a range of institutions, including hospitals, secure units and prisons, should be undertaken to ensure the measures are taken to prevent high indoor temperatures.*
- *Intervention measures, such as media warnings, need to be designed to work across all the communities they address, considering language and cultural barriers. Novel ways of reaching all communities should be considered, including, for instance, making use of the networks provided by faith groups. A variety of communications options need to be planned for, since during a sustained heat wave the media may lose interest in public health messages.*
- *Importantly, emergency planners in London need to be prepared for heatwaves and integrate risk management measures into their plans, in the same way that they currently address flood risk management. ”*

⁷¹ London Climate Change Partnership. 2006. Adapting to climate change: Lessons for London. Greater London Authority, London.

Theme 10. Siting major infrastructure

Decisions on where to site major infrastructure are based on proximity to existing infrastructure and ease of planning permission, rather than an assessment of climate risks (e.g. flood risk and availability of water resources).

Energy supply infrastructure

Through the **UK Energy Review**⁷² and **Energy White Paper**⁷³ (2007) the UK government has concluded that “new nuclear power stations could make a significant contribution to meeting our energy policy goals.” Early signals are that the government is looking to locate these on existing nuclear sites to speed up planning permission. As most existing nuclear sites in the UK are located on the coast, this policy could result in intensification of coastal and tidal flood risks.

In addition, unless climate change is taken into account in the facility design, climate change could mean reduced efficiency or even shut downs when cooling water is too warm.

Waste management infrastructure

Incinerators are also generally built on existing or previous sites because of proximity to existing infrastructure, public opposition to new sites being identified for waste, and ease of planning permission. Site safeguarding policies are found in emerging English **Minerals and Waste Development Frameworks (M&WDF)**. Regional Spatial Strategies also promote the use of existing waste and industrial sites, partly because of public opposition to new sites being identified for any waste use. We have not reviewed all documents on waste policy, which is set at a county level. An examination of a few Waste Local Plans (the M&WDF’s predecessor) and Waste Core Strategies (the first Development Plan Document to be prepared for M&WDFs) reveals that neither takes account of climate change. Site decisions are not based on an assessment of climate risks, and there may be more appropriate sites in the face of climate change. For example, existing sites may be increasingly vulnerable to water resource problems (incinerators require large quantities of water for cooling). They may also be increasingly vulnerable to flooding, though this is less important for incinerator than it is for nuclear power facilities. Unless incinerators deal with hazardous waste they are classified as “less vulnerable” for flood risk purposes, and may be sited within zones of medium to high probability of flooding.⁷⁴

⁷² The Energy Challenge: Review. July 2006. Department for Trade and Industry.

⁷³ Meeting the Energy Challenge: A White Paper on Energy. May 2007. Department for Trade and Industry.

⁷⁴ Planning Policy Statement 25: Development and flood risk. December 2006.
www.communities.gov.uk.

Theme 11. Carbon neutral is not climate-proof

Policies that contribute towards climate change mitigation objectives can sometimes increase vulnerability and exposure to climate risks. Adaptation and mitigation policy should be developed to provide complementary direction.

Climate change policies at all levels commonly emphasise mitigation over adaptation. While progress towards target-based mitigation objectives is measurable, adaptation is less quantifiable and the evidence-base for policy is weaker. The policy bias that emphasises mitigation can pose problems when, for example, buildings designed to maximise energy efficiency are increasingly vulnerable to heat risks.

Buildings

The Housing Green Paper presents proposals for modernising housing policy in England, as well as improvements to housing benefit help in England, Scotland and Wales. The Green Paper outlines a target for all new homes to emit 25% less carbon by 2010, and 44% less by 2013. It also calls for all new homes to be zero carbon by 2016. Through the **EU Directive on Energy Performance of Buildings**⁷⁵, the **Code for Sustainable Homes**⁷⁶ in England, and Part L of the UK Building Regulations, builders and developers are required to minimise heat loss and maximise energy efficiency in new buildings. In order to do this cheaply, developments can incorporate single aspect orientations, small windows, sealed draughts, etc., all of which may lead to overheating problems during hot periods.

Regeneration

Land use planning policy which encourages regeneration in city centres often cites the climate change mitigation benefits of higher density, including shorter travel distances, more viable public transport and community heating/cooling schemes. Unless these new developments are designed with the future climate in mind, however, they may intensify the urban heat island effect and pose problems for urban drainage, contributing to overheating and flash-flood risks, as described under Theme 3.

Water management

There is conflict between adaptation and mitigation in water management policy as well. Climate change will lead to lower seasonal river flows and reduce the dilution of wastewater effluent. Policy to reduce greenhouse gas emissions may hinder our ability to provide the additional (and often energy-intensive) water treatment necessary to maintain or improve high European and national standards for water quality.

⁷⁵ Directive 2002/90/EC on the energy performance of buildings

⁷⁶ Code for sustainable homes: a step-change in sustainable home building practice. December 2006. Department for Communities and Local Government.

Biofuels

Finally, the climate change mitigation policies that promote maize for production as biofuel will increase soil erosion risks, as detailed in Theme 2.

This theme highlights a variety of dilemmas for policy makers. Can we design housing and spatial planning policy that will contribute towards mitigation goals without constraining our ability to design urban environments that are comfortable in a changing climate? Will we choose to maintain high quality water standards or reduce the emissions – or can we do both? Integrated and complementary policies that take both adaptation and mitigation into account are absolutely essential.

Theme 12. Uncertain future benefits

Effective adaptation poses a challenge for markets, as it requires an assessment of certain present cost against uncertain future benefit.

Decision-makers will be reluctant to implement an adaptation strategy unless it can be justified by cost-benefit analysis, According to the Stern Review, "Even if the benefits of adaptation can be realised over a relatively short time-horizon, unless those paying the costs can fully reap the benefits, there will be a barrier to adaptation. For example, there will be little financial incentive for developers to increase resilience of new buildings unless property buyers discriminate between properties on the basis of vulnerability to future climate."⁷⁷

This barrier is related to the primacy of policy, and reflects that fact that climate change adaptation has not yet found its place in the policy hierarchy. The lack of hard data and cost benefit analyses for adaptation contributes to this.

⁷⁷ Stern Review on the Economics of Climate change. 2006. www.sternreview.org.uk.

Conclusions and next steps

Climate change is an increasingly high-profile political and media issue and is of great concern to the general public in the UK and the Netherlands. Though policy-makers are keen to demonstrate leadership in responding to climate change, adaptation is still finding its place within policy objectives. Our research shows that adaptation is not yet viewed as an overarching policy objective, nor yet is it considered essential to our ability to meet other policy objectives, like sustainability.

Climate change requires long-term perspectives in policy-making – longer than political mandates. Politicians must be proactive in devising policy for climate risks, by anticipating future changes in average climate conditions as well as changes in extreme events (like droughts, heat waves and floods). Reactive policy-making in response to extreme climate events is no longer a sustainable approach.

There is, however, evidence that adaptation is becoming much more important in policy. For example, the recently released EC Green Paper on Adaptation is the first step towards EU Directives being climate-proofed. The draft English Planning Policy Statement on climate change shows that this is now a high-level integrating issue for spatial planning. Finally, the UK Housing Green Paper calls for all new homes to be zero carbon by 2016, setting the standard for future policies to be very ambitious and challenging.

In undertaking this work, we assumed that many of the barriers to adaptation would come from policy itself, but we found that there are significant barriers in the perception and interpretation of policy. This finding underlines the importance of combining change management and risk management approaches for integrating adaptation into spatial planning. In addition to embedding climate risk management into spatial planning guidelines, it is vitally important to ensure that strategic change management occurs both internally, within organisations, and externally, with the people that are affected by spatial planning decisions.

This piece of work has uncovered areas that need further investigation in terms of climate change adaptation, and this report will form the baseline for other projects in the ESPACE Extension, which will also investigate perceived vs. real barriers in spatial planning policy. The ESPACE Extension project will build on this work by analysing the issues surrounding local implementation and delivery of climate change policies laid out in the South East of England Regional Spatial Strategy (SE Plan) and the South East Climate Change Implementation Plan. A second case study will use a real-life scenario in the Netherlands to explore the barriers and issues surrounding municipal implementation of water storage at the local level. Further work under the ESPACE Extension will develop tools for local decision-making and organisational change.

Key implementation agencies for adaptation

Shortlist of policy areas	Key implementation agencies (UK)	Key implementation agencies (NL)
Environment: Nature conservation, landscape and waste	Natural England Environment Agency Rural Payments Agency Scottish Natural Heritage Countryside Council for Wales Landowners/managers Farmers Local authorities Companies Soil Association Water companies Internal Drainage Boards Forestry Commission BERR (formerly DTI) National Trust Crown Estates Energy companies Sea Fisheries Shellfish Committees Commercial fishermen RSPB, NGOs	Ministerie VROM Local authorities Water companies Waterboards Land owners Provincial government Staatsbosbeh DLG/LNV Farmers Natuurmonumenten Energy suppliers RIKZ
Climate change	Regional climate change officers, Regional Climate Change Partnerships UKCIP Local authorities Defra All government departments (through the Adaptation Policy Framework). RDAs Water companies	Ministerie van Economische Zaken KMNI Ministerie VROM Local authorities Water companies Waterboards
Economics and finance	Local authorities Banks Business Insurance/reinsurance Investors	Ministerie van Economische Zaken Reinsurance companies Banks

	Treasury The City	Investors Ministry of Transport Cabinet
Emergency planning	LA Emergency planners Emergency services Environment Agency Army NGOs, Red Cross	Ministry BZK Local authorities Waterboards Ministerie OCW Ministerie of Defence Rode Kruis NGOs
Flood risk management: Coasts, rivers and drainage	Water companies British Waterways Environment Agency Local authorities Developers Landowners, incl MoD Homeowners Internal Drainage Boards Ports (incl. private) BMIF Natural England National Trust Crown Estates RSPB, NGOs	RWS Ministry of Water Management Waterboards Water companies Kustwacht
Land use planning	Local authorities RDAs GLA Welsh Assembly Scottish Government Developers	Local authorities Provincial government Waterboards Developers Grondbedrijf Natuurmonumenten Statsbosbeh Water companies Land owners Ministry of Transport Ministry of Nature and Fisheries Rijkswaterstaat
Regeneration and structural funds	English Partnerships RDAs Local authorities Builders Developers Architects Housing Associations Engineers, contractors	Local authorities Developers Builders Architects

Water resource management –quality and quantity	Water companies British Waterways Environment Agency Local authorities Developers Landowners, homeowners Internal Drainage Boards	RWS Ministry of Water Management Waterboards Water companies Kustwacht

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References

3e Kustnota: Traditie, Trends en Toekomst. Ministerie van Verkeer en Waterstaat. 2000.

Amended Circular on Environmental Impact Assessment: A consultation paper. June 2006. Department for Communities and Local Government (www.communities.gov.uk).

A Sea Change: Marine Bill White Paper. March 2007. Defra.

BRANCH partnership. 2007. 'Planning for biodiversity in a changing climate – BRANCH project Final Report', Natural England, UK.

Civil Contingencies Act 2004 (cap 36).

Climate Change and the EU Birds Directive. A Perspective from The Royal Society for the Protection of Birds. September 2005.

Climate change and the indoor environment: impacts and adaptation. 2005. CIBSE Technical Memorandum 36. CIBSE, London.

Code for Sustainable Homes: a step-change in sustainable home building practice. December 2006. Department for Communities and Local Government (www.communities.gov.uk).

Controlling soil erosion: a manual for the assessment and management of agricultural land at risk of water erosion in lowland England. 2005. Defra.

Ecologische hoofdstructuur (Dutch National Ecological Network)

Ennos, R., Worrell, R., Arkle, P. and Malcolm, D. Genetic variation and conservation of British native trees and shrubs: Current knowledge and policy implications. Technical Paper 31. Forestry Commission. 2000.

European Environmental Bureau input into EC consultation for Adaptation Green paper: biodiversity and ecosystem services. September 2006 (www.eeb.org/activities/biodiversity).

European Community Communication COM/00/547 on Integrated Coastal Zone Management.

European Community Directive 79/409/EEC on the conservation of wild birds.

European Community Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

European Community Directive 97/121/EC on Environmental Impact Assessment.

European Community Directive 2001/42/EC on Strategic Environmental Assessment.

European Community Directive 2002/90/EC on the energy performance of buildings.

European Spatial Development Perspective: towards balanced and sustainable development of the territory of the European Union. 1999. Agreed at the Informal

Council of Ministers responsible for spatial planning, Potsdam. Luxembourg: Office for Official Publications of the European Communities. CEC.

European Union Directive 2000/60/EU – Water Framework Directive.

Energy Challenge: A Review. July 2006. Department for Trade and Industry.

Flood and Coastal Defence Appraisal Guidance. FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts. October 2006. Defra.

Guidelines for the Sustainable Management of Forests in Europe. Ministry of Agriculture and Forestry. Finland 1993.

Heritage Protection for the 21st Century. 2007. Department for Culture, Media and Sport.

Hubbert, J. and Cottrell, J. The role of forest genetic resources in helping British forests respond to climate change. Information Note. Forestry Commission, Edinburgh. June 2007.

Hulme, M., Jenkins, G.J., Lu, X., Turnpenny, J.R., Mitchell, T.D., Jones, R.G., Lowe, J., Murphy, J.M., Hassell, D., Boorman, P., McDonald, R. and Hill, S. (2002) Climate Change Scenarios for the United Kingdom: The UKCIP02 Scientific Report, Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, UK.

Impact assessment on integrated urban drainage (early development of options), Annex B. 2007. Department for Environment, Food and Rural Affairs.

IPCC. 2007. Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Geneva.

Kelling to Lowestoft Ness Shoreline Management Plan. First Review. Amended report. August 2007. North Norfolk District Council.

Koskela, J., Buck, A. and Teissier du Cros, E. Eds (2007). Climate change and forest genetic diversity: implications for sustainable forest management in Europe. Biodiversity International, Rome, Italy.

London Climate Change Partnership. 2006. Adapting to Climate Change: Lessons for London. Greater London Authority, London.

Making space for water: taking forward a new Government strategy for flood and coastal erosion risk management in England. March 2005. Department for Environment, Food and Rural Affairs.

McEvoy, D. Lindley, S. Handley, J. (2006) Adaptation and Mitigation in Urban Areas: Synergies and Conflicts. Municipal Engineer, Issue ME4.

Meeting the Energy Challenge: a White Paper on energy. May 2007. Department for Trade and Industry.

National Bestuursakkoord Water. Dutch National Water Management Agreement.

North Norfolk District Council. 2004. Shoreline Management Plan Consultation Begins. Retrieved from http://www.northnorfolk.org/news/archive2004_5541.asp

- North Norfolk District Council. 2007. Shoreline Management Plan. Retrieved from http://www.northnorfolk.org/coastal/default_5265.asp
- Nota Ruimte (English summary), Dutch National Spatial Strategy. 2006. VROM.
- Organic Entry Level Stewardship Handbook. 2005. Defra.
- Our Coasts and Seas: Making Space for People, Industry and Wildlife. 2005. English Nature (http://www.english-nature.org.uk/science/coasts_and_seas/default.asp).
- Our Countryside: The Future - A Fair Deal for Rural England. Rural White Paper. 2000. Defra.
- Pattison, Gary. 2004. Planning for decline: the 'D' village of County Durham, UK, in *Planning Perspectives*, Volume 19, Number 3, pp. 311-332(22)
- Piper, J.M., and others. 2006. Spatial planning for biodiversity in our changing climate. *English Nature Research Reports*, No 677.
- Planning for a Sustainable Future: White Paper. May 2007. Department for Communities and Local Government (www.communities.gov.uk).
- Planning Policy Guidance 15: Planning and the historic environment. 1994. Department for Communities and Local Government (www.communities.gov.uk).
- Planning Policy Statement 1: Delivering Sustainable Development. 2005. Department for Communities and Local Government (www.communities.gov.uk).
- Planning Policy Statement 3: Housing. November 2006. Department for Communities and Local Government (www.communities.gov.uk).
- Planning Policy Statement 11: Regional Spatial Strategies. 2004. Department for Communities and Local Government (www.communities.gov.uk).
- Planning Policy Statement 25: Development and Flood Risk. December 2006. Department for Communities and Local Government (www.communities.gov.uk).
- Quality and Choice: A Decent Home for All. Housing Green Paper. September 2006. Department for Communities and Local Government (www.communities.gov.uk).
- Rahmstorf, S., et al., (2007) Recent climate observations compared to projections. *Science*, 316, 709, doi:10.1126/science.1136843.
- Regional Spatial Strategy for Yorkshire and the Humber to 2016. December 2004. Government Office for Yorkshire and the Humber.
- Rural Strategy. 2004. Defra.
- Select Committee on Environment, Food and Rural Affairs, Minutes of Evidence. (<http://www.publications.parliament.uk/pa/cm200102/cmselect/cmenvfru/411/1112812.htm>)
- South East Plan. Draft Plan for submission to Government. March 2006.
- Staffordshire and Stoke-on-Trent Waste Local Plan: 1998 to 2011. Adopted 2003. Staffordshire County Council.
- Stern Review on the Economics of Climate Change. 2006. (www.sternreview.org.uk).

- Strategic Environmental Assessment and climate change: Guidance for practitioners. 2007. UK Climate Impacts Programme, Environment Agency, Levett-Therivel sustainability consultants and others (available from www.ukcip.org.uk/resources/publications/pub_dets.asp?ID=64).
- Taylor, P. 2007. Time to Adapt: Climate Change and the European Water Dimension. Conference presentation, Berlin.
- The UK Forestry Standard: The Government's Approach to Sustainable Forestry. 2nd Edition. 2004.
- Towards a future Maritime Policy for the Union: A European vision for the oceans and seas. June 2006. EC Green Paper.
- Town and Country Planning (General Permitted Development) Order 1995. S.I. 1995/418.
- UK Woodland Assurance Standard. 2nd Edition. UKWAS Steering Group, Edinburgh. 2006.
- Vulnerability and adaptation to climate change. EEA Technical Report 7/2005. European Environment Agency 2005.
- Waste Core Strategy: Issues and Options. 2007. Staffordshire County Council.
- Waterplan (Dutch municipal-level water management policy).
- Water Framework Directive: a position statement. 2003. Environment Agency.
- Water Industry Act 1991 (cap 56).
- Wet op de ruimtelijke ordening. Dutch National Spatial Law.
- Willows, R.I. and Connell, R.K. (Eds.). (2003). Climate adaptation: Risk, uncertainty and decision-making. UKCIP Technical Report. UKCIP, Oxford.