NR0105 – Natural Resource Policy Framework Analysis

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Prepared for: Heather Blake

Sustainable Land Use: Natural Resource Protection
Defra
5B, Ergon House
Horseferry Road
London, SW1P 2AL

Prepared by: ADAS UK Ltd
Woodthorne
Wergs Road
Wolverhampton
WV6 8TQ

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Acknowledgements

The Team

Executive Summary

This report considers Defra's natural environment policy framework, the drivers that have shaped the framework and the recently published Defra vision for natural resources. In considering the policy framework we have sought to identify gaps and synergies where different policy strands might be considered to reinforce, undermine or weaken an outcome. For the purpose of this study the term policy includes legislation, treaties, international agreements, economic instruments and voluntary agreements and refers to government seeking to affect the natural environment either through direct interventions or the support of cooperative approaches with industry.

The study considers a wide range of themes that are considered to be natural resources, or at least facets of natural resources, and include:

- biodiversity (including habitats and ecosystems);

- water quality, supply and demand;

- the marine environment;

- the soil environment;

- landscapes;

- air quality ;

- recreation and access to the natural environment.

We have not attempted to capture every policy that may affect the natural environment but have sought to identify what we consider are issues that illustrate synergies, gaps or conflicts in the natural environmental policy framework. However, we have attempted to at least summarise the major policies associated with each of the themes above as a basis to support our observations and recommendations. We have also chosen to describe what we consider as threats (i.e. transport, climate change, housing, energy, fishing, food production, waste and tourism) to the outcomes of the policy framework to illustrate where gaps or conflicts exist or how other policy strands can or do provide synergies that could be used to overcome or limit these threats.

The Defra natural environment policy framework is strongly influenced by EU policy (e.g. biodiversity policy) as well as international agreements (e.g. RAMSAR convention). Overarching, more aspirational objectives, have evolved from the World Summit on Sustainable Development (WSSD) and are reflected in the UK's Sustainable Development Strategy which seeks to pull together a wider ranging set of objectives covering the social, economic as well as environment themes summarising the policy framework that will guide and influence the delivery of the strategy. Indeed, it us our contention that a natural environment policy framework exists and this is set out in chapter 5 of the UK's Sustainable Development Strategy.

Even though about 80% of UK's natural environment policy originates in EU policy it is apparent that this has been used to build on existing policy, for example the EU Birds and Habitats Directive designated areas (SPA's and SAC's respectively) have been gazetted around or to include the UK designated SSSI's or Nature Reserves (NR). Thus, in many cases EU policy might be considered as complementary to existing UK

natural environment policy, although it would seem that EU natural environment policy often distinguishes itself in that it goes further i.e. the targets or legislation itself is stricter than the UK natural environment policy e.g. the European Drinking Water Directive, enacted in 1980 and effective in 1985, established a maximum admissible nitrate (NO_3) concentration of 50 mg L^{-1}. Previously, however, a higher limit of 100 mg L^{-1} had applied in England; even that level was advisory, and water with more nitrates was not considered polluted.

Although a natural environment policy framework is in place there are other significant policies, notably the Common Agricultural Policy (CAP) that have had a strong impact in the past in undermining the outcomes of the NR policy framework. Arguably over the last decade with the gradual reforms of the CAP there are now mechanisms that allow this policy to complement or strengthen NR policies (e.g. agri-environment measures, cross compliance and single farm payments). Many argue that the reform of the CAP does not go far enough in removing environmentally harmful subsidies or in the provision of support that will really bring about a change in farm practices that will make a positive impact on the natural environment. Other economic sectors that affect the NR policy framework include transport, energy and industry and although the integration of environmental policy into these economic sectors is a key element of the EC 6th Environment Action Plan there does seem to be a consensus that this process has not gone far enough.

Appropriate institutional arrangements are an important element of a NR policy framework. Any vision or strategy needs to be supported by effective institutional arrangements to deliver and monitor activities and measures. Not only this, the concept of an ecosystems approach applied to policy development requires effective communication and supporting processes across Defra departments, and where appropriate with other government departments, to ensure policy leads are able to work together. The "policy gateway", used by all Welsh Assembly Departments is an example of a tool through which every policy has to "pass", which asks whether the connections with other relevant policies have been thought through and provides an opportunity to explore synergies and conflicts and how these may be resolved. We question whether there is greater scope in Defra and the Defra family to adopt a more holistic approach to policy development and, whether there are adequate frameworks or tools to foster broader thinking that, for example, engenders the ecosystems approach.

We have drawn a number of conclusions and recommendations including:

1. Defra needs to proactively interact with the European Commission, international and national government departments, within Defra itself and with other key influencers/stakeholders to ensure existing policies take account of the need to protect and enhance natural resources. Ideally formal or statutory processes within Defra and across government should be established rather than being left to individual policy divisions to set up. Improvements in the communication process e.g. vertical and horizontal dialogue with other government departments and local authorities, transparency, balance of flexibility and timeliness are all required.

2. The central decision-making capability of governments and businesses need to recognise that natural resources will receive far better protection if their importance is valued and is a key priority , rather than leaving policies associated with ecosystems to less influential and possibly siloed environment departments.

3. There needs to be agreed, accountable and transparent methodologies to achieve balanced outcomes. Relevant departments need to assess proposals with respect to delivering the Vision - producing clear statements on compromise areas. Details, such as, responsibilities, policy instruments, priorities, interactions, conflicts etc. are not always described or understood and greater clarity is required to provide a clearer picture of the strategic, operational and delivery policy framework.

4. Defra should identify and prioritise the ecosystem services which should be preserved or enhanced and relate the Vision to these rather than aspiring to ' improve air and water quality and effectively manage landscapes, forests and soils'. That is, the Vision sets out very aspirational objectives without clearly relating these to actual ecosystems that need to be preserved or protected. In doing this it may then be feasible to identify which policies conflict with natural resource protection policies and then seek to redress the balance..

5. Defra's evidence-based policy model in the consultation - Evidence and Innovation Strategy[1], provides an ideal operational model for developing and evaluating the success of existing policies and their delivery. Within this model there needs to be a greater recognition of the interaction between Defra's different strategic and policy outcomes and their integration with sectoral policies. This process is iterative and will lead to better understanding of the evidence base and thus improved policy development. The evidence base needs to be collectively re-evaluated to integrate single-issue concerns to support a more integrated ecosystem approach to policy development.

6. Defra should challenge its existing directorate and divisional structure to identify whether it is sufficiently adaptable to deliver integrated policies. Defra should consider establishing more crosscutting, temporary if appropriate, groups to ensure flexibility and integration of policy. Often there seems to be little account taken of the socio-economic consequences of policy; we note that science co-ordinators have been assigned to Defra policy divisions and assigning an economist and social scientist to policy divisions may ensure better integration of socio-economic aspects into policy making.

7. A more comprehensive review of the threats to the natural resources is required to determine the resulting priorities. A transparent prioritisation process then needs to be agreed.

8. Policy integration tools need to be examined further. These approaches and tools should be considered and their suitability assessed for implementation across relevant Defra and other government departments, e.g. the Policy Gateway process – used by the Welsh Assembly Government. Defra should consider adopting a similar scheme to the Rural Proofing process and checklist that departments are required to apply to both the design and delivery stages of all policies, programmes and initiatives and which then inputs into the RIA.

9. There is a clear need for Defra to develop a more coherent and joined up communication on their policies and their development with Local Government to optimise opportunities to protect the natural environment. The approach should consider how local activities, civil society, landowners and the private sector can more effectively work with Defra. There is scope to improve communication between Local Government and central Defra Departments so that there is a

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[1] Evidence and Innovation Strategy 2005-2008, Consultation Document, 2005, Defra,

better understanding and clarity relating to the Defra Vision and related strategies and so that they can be more effectively championed locally. The many different government organisations with an interest in the natural environment often confounds the situation resulting in a complex network of relationships, funding streams to protect or enhance the natural environment and ownership of strategies.

10. It is not clear what mechanisms operate to ensure the overall accountability of Government Departments including Defra, Defra agencies and Local Authorities in implementing natural environment policies. The processes by which priorities are identified and then agreed and implemented need to be clearly understood before improvement measures can be made. We recognise there are often a range of interrelated drivers impacting the natural environment and, the complex nature of the natural environment policy framework – however, this should not be an excuse to more clearly articulate to society who is accountable for implementing natural environment policies and the processes for identifying priorities.

11. It is apparent that there is a significant dependency on agricultural policy to deliver natural environment outcomes, not least biodiversity outcomes and increasingly improvements in water quality especially in terms of control of diffuse pollution from farming practices. There is a risk that over dependence on agricultural policy to deliver natural environment outcomes may dilute what can be achieved;

12. Defra should consider whether existing spatial frameworks e.g. regional and local plans, etc could provide a suitable mechanism for guiding policy delivery locally or whether a different approach e.g. based on ecosystems or natural areas like joint character areas or catchments is more appropriate etc.

13. Further work is needed to understand and develop analytical tools to identify whether individual policies are working and whether the combined impact of a range of policies impacts on the functioning of an ecosystem. Indicators or targets that represent the functioning of ecosystems, the long-term health of the system and the services it performs for human benefit are required to evaluate policy success and the achievement of the Vision. If the ecosystem management approach is to be adopted further, research will be required to define objectives and targets.

14. Defra needs to develop a formal policy on consultation and stakeholder engagement to achieve a balance of views from all stakeholders. The process needs to be seen to be of benefit and that stakeholders can contribute effectively to the policy outcomes. The drivers behind public attitudes that embrace the protection of the environment should be investigated, to see whether any lessons could be learnt to improve engagement with the public and other stakeholders such as industry and regional authorities.

Contents

1. Introduction

Economic, social and environmental value can be attributed to natural resources and there is a need to ensure policies are consistent in seeking to protect and enhance these natural resources. This is reflected in Defra's Five Year Strategy, the associated PSA1 target to "promote and enhance sustainable development across government and in the UK and internationally...." and the UK's Sustainable Development Strategy. This builds on the Government's commitments at the World Summit for Sustainable Development and obligations under the EU 6th Environmental Action Plan which places sustainable development and the integration of environmental considerations into economic and sectoral decisions and associated policies.

A number of Defra Directorates General, Defra delivery agencies and several other Government Departments have the responsibility for policies and strategies that protect the natural environment. Most of the policies derive from requirements of EU legislation and have evolved over time resulting in a range of policies addressing different aspects of the natural environment. Arguably, the raft of polices addressing the natural environment has developed through the introduction of individual policies seeking to address specific issues so that policy making might be said to be both remedial and reactive in approach.

In addition there is an emerging groundswell of opinion that unless protection of the natural environment and the benefits that it provides are set as clear policy objectives and given primacy as measures of social well-being, there is a risk that environmental policy will continue to be reactionary and remedial. Furthermore, and perhaps more importantly, in terms of sending the right signals to society, there is a risk that without setting out a clear vision of what different facets of natural environment policy are seeking to achieve then the range of policies in place and in the pipeline will become dis-jointed and fragmented.

The UK Sustainable Development Strategy provides the context within which the wide ranging aspects of policy affecting the natural environment reside and goes further to included a commitment to:

"*Work with stakeholders to develop a clear vision and coherent approach for the UK to the protection and enhancement of the natural environment by the end of 2005.*"

As part of the process of setting out to fulfil this commitment, the Natural Resources and Rural Affairs Directorate of Defra produced a draft Vision for natural resources/the natural environment in 2005, (Appendix I) through a process of active engagement with stakeholders. Arguably, natural environment policy must be able to deliver this vision and this scoping study report provides a strategic overview and assesses how well this framework can deliver the UK vision. The focus is not to describe and assess how effective each individual policy area is in achieving its own objectives, but rather how these individual policy areas may together contribute to natural resources protection as a whole, i.e. the effects of individual policies on ecosystems and ecosystem services.

1.1 Ecosystem services

Against this backdrop and as an extension or alternative to the term sustainability the concept "ecosystems services" is gaining prevalence in government and civil society

as a term that highlights the dependence of economic and social well-being on the end products of nature i.e. the term services conveys a basic truth: human welfare is dependent on natural systems[2]. It is vitally important therefore that the value of ecosystems is explicitly recognised by decision makers and built into ways of managing natural resources and overall governance (and planning) frameworks, since failure to do so will result in friction between those who promote the concept of ecosystems and those who, while sympathetic to the concept, are locked into a policy framework that cannot accommodate it. In failing not to account for the value of ecosystem services and not modifying existing governance and planning frameworks there is a real risk that this will result in poorer decisions being made that have a negative impact on the environment.

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[2] Boyd. J.W. and Banzhaf H.S. (2005). Ecosystem services and government accountability: the need for a new way of judging nature's value. Resources Summer 2005.

2.   Characterising the natural environment policy framework

This section provides an overview of the policies associated with or affecting natural resources, and seeks to characterise the policies within a common framework. The different policy agendas of the natural environment are introduced and the complexities of the institutional aspects of the policy framework are briefly described.

2.1   Defining policy and natural environment

For the purpose of this study the term policy includes legislation, treaties, international agreements, economic instruments and voluntary agreements and refers to government seeking to affect the natural environment either through direct interventions or the support of cooperative approaches with industry[3]. We have not attempted to capture every policy that may affect the natural environment but have sought to identify what we consider are issues that illustrate synergies, gaps or conflicts in the natural environmental policy framework[4].

Natural resources are taken here to mean natural materials essential to humans, such as water, air, land, trees, animals, plants, soil, and minerals. Non-renewable resources, such as water and natural gas are not replaceable once they have been used, although water can be recycled. For the purpose of this report the natural environment is taken to mean:

- biodiversity (including habitats and ecosystems);

- water quality, supply and demand;

- the marine environment;

- the soil environment;

- landscapes;

- air quality ;

- recreation and access to the natural environment.

Based on this understanding we have considered policies that are associated with each of these themes but also have considered what economic sectors and their associated policies are likely to affect the natural environment. In doing this we are able to map the wider policy framework and how this affects the outcomes of the natural environment framework.

2.2   Drivers of natural environment policy – the international dimension

The UK has made progress in putting in place the building blocks for making a transition towards sustainable development, although it may be argued that this has been helped by the "Europeanisation" of UK environmental policy[5] and the increasing influence of global institutions, such as the UN, with an institutional capacity to consider the natural environment which have given rise to a number of international

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[3] Such as the Voluntary Initiative http://www.voluntaryinitiative.org.uk
[4] Annexed to this report are summaries of key policies that make up or influence the natural environment policy framework.
[5] Jordan A. The Europeanisation of UK environmental policy: a departmental perspective. Working paper 11/00. School of Environmental Science, University of East Anglia, NR4 7TJ

treaties[6] of which the UK is a signatory or party[7] - Box 1 illustrates the relationship and use of UK environment policy and regulation to implement international agreements; it is also apparent the interaction of other EU and UK natural environment policy to protect the natural environment.

Box 1 – interaction of international and national policy – the RAMSAR Convention

The RAMSAR Convention, officially know as the The Convention on Wetlands of International Importance, especially as Waterfowl Habitat, is an international treaty for the conservation and sustainable utilisation of wetlands. The treaty recognises the pressures on wetlands for example from agriculture (drainage of wetlands for crop production), tourism or industrial development, and seeks to prevent the encroachment or loss of wetlands recognising their ecological functions, economic, cultural, scientific and recreational value.

The UK ratified the Ramsar Convention in 1976. The UK has generally chosen to underpin the designation of its Ramsar sites through prior notification of these areas as Sites of Special Scientific Interest (SSSIs). Accordingly, these receive statutory protection under the Wildlife & Countryside Act (WCA) 1981. In England and Wales, further protection is provided by the Countryside and Rights of Way (CRoW) Act 2000. Government in England and Wales has issued policy statements relating to the special status of Ramsar sites. This extends the same protection at a policy level to listed Ramsar sites in respect of new development as that afforded to sites which have been designated under the EC Birds and Habitats Directives as part of the EU Natura 2000 network. A National Ramsar Committee acts in an advisory capacity to assist government in the implementation of the Convention. The Committee has well-focused Terms of Reference and a rolling three-year work plan linked to the Convention's Strategic Plan. A range of other activities also support the Convention's implementation including the UK Biodiversity Action Plan, involving action on a wide range of wetland habitats and species, and UK implementation of the EC Water Framework Directive (2000/60/EC), the EC Directive on the conservation of wild birds (79/409/EEC), the EC Habitats and Species Directive (92/43/EEC), and the African-Eurasian Waterbirds Agreement. In the UK 146 sites have been designated under the RAMSAR convention equivalent to about 759 942 ha.
Source: JNCC - www.jncc.gov.uk

2.2.1   The EU as a policy driver

The EC did not develop a clear authority for environmental legislation until 1972, when the Heads of State or Government of the Member States noted that economic expansion should improve the quality of life and standard of living, and they recognized that environmental protection required special attention. These officials invited establishment of a Community environmental policy. In 1973, therefore, the Council of Ministers adopted the first in a series of Action Programs on the Environment to set out Community environmental policy. The Environmental Action Programs announced Community policy, but have no binding legal force and authorize no legislation. Nonetheless, the Programs have shaped environmental policy and often influence subsequent legislation. The first three EAPs, which link environmental protection with EC economic policy, preceded enactment of the Single European Act (SEA) and its new environmental title. The Fourth EAP came after the

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[6] The UN Framework Convention on Climate Change; The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); The Convention on Wetlands of International Importance especially for Waterfowl Habitat (Ramsar); the Convention on Biological Diversity. See for example ENTRI (Environmental Treaties and Resource Indicators) http://sedac.ciesin.columbia.edu/entri/index.jsp for a more comprehensive list of international environment treaties to which the UK is a signatory or party of. The UK's Securing the Future also lists many of the international treaties relevant to the natural environment to which the UK is a signatory or party of – see http://www.sustainable-development.gov.uk/publications/pdf/strategy/Chap%205.pdf pg. 102
[7] Other examples of international treaties to which the UK is contracting party include the OSPAR Commission – for the protection of the marine environment of the north east Atlantic (see http://www.ospar.org/eng/html/welcome.html).

SEA, and the Fifth followed the Maastricht Treaty. Later programs amend, rather than replace, earlier programs: "In reality, . . . there is only one program, which has been periodically updated and amended." The most recent programs, however, reflect amendments to the EEC Treaty and new (or proposed) legislative measures.

The Treaty of Amsterdam, effective May 1, 1999, after Member State ratification, further emphasizes the importance of the environment. It enshrines the principle of sustainable development in the preamble and objectives of the Treaty and among the tasks of the Community. The Treaty of Amsterdam retains the provision that Member States may maintain or introduce more stringent environmental measures than those adopted by the EC. Further, after the EC adopts a harmonization measure, a Member State may maintain national provisions related to the environment and, if based on "new scientific evidence relating to the protection of the environment," a Member State may introduce national provisions, after notification to the Commission.

EU environmental policy[8] tends to be driven by issues that are noted as of wider European concern, although this has proved relatively comprehensive. This is exemplified in the Thematic Strategies currently being produced under the 6th EAP. The 6th EAP is not as ambitious as the 5th EAP focusing more on persistent environmental problems such as climate change, halting the loss of biodiversity and reducing resource consumption and advocating a framework of principles and objectives which are picked up and developed in more detail in thematic strategies that address key issues such as: clean air, the urban environment, marine environment, recycling, soils, resources and pesticides[9].

EU environmental policy is also limited by factors such as competence under the Treaty (so that local planning issues, including transport, are rarely addressed) and some issues may not be accepted (e.g. agreement on an EU-wide tax, such as for carbon). It is also important to note that EU environmental law contains a range of flexibility that the UK needs to address. This flexibility is provided in line with the principle of subsidiarity that the scope of EU action should be limited to what it can do best, and that the UK should decide details if they are best placed to do so. The range of flexibility includes:

- Regulations that leave little scope for flexibility

- Directives which set specific requirements, e.g. an emission limit value, that allow little or no flexibility in implementation.

- Directives that establish procedures with relatively detailed requirements which allow some flexibility, but certain obligatory elements (e.g. IPPC).

- Directives that establish procedures with much wider discretion (e.g. planning within the water framework Directive).

- Directives that set out environmental goals to be established, but are not prescriptive as to the means of achieving them, thus providing much flexibility of instruments, etc.

Where flexibility exists, the UK has the opportunity to identify options for implementation that fit better with the administrative culture of their country. The options chosen can also reflect the costs and benefits to business according to the

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[8] The UK's Securing the Future summarises some of the EU environment policy affecting the natural environment – see http://www.sustainable-development.gov.uk/publications/pdf/strategy/Chap%205.pdf pg. 105.
[9] EEB (2005). EU Environmental Policy Handbook; a critical analysis of EU environmental legislation.

state of the environment, the specific local problems, the specific local stakeholders etc..

In our discussions with UK governmental institutions many staff view their interaction with the European Commission and other EU bodies as insufficient. However, many EU bodies view UK institutions as highly effective at 'lobbying'. The production of the Thematic Strategies has included considerable analysis of issues and participation of UK officials in an integrated approach not previously seen to this extent.

2.3   Developments in UK environment policy

The UK, given its industrial heritage, has a relatively long history of 'controlling' and 'governing' the side-effects of economic activities that have potential to cause damage to people, their health and property.   Total societal welfare is made up of the sum of the consumption of 'private' goods (that are bought and sold in the market place) and 'public' goods (that are freely available and not subject to market transactions such as a clean and safe environment). The production and consumption of private goods can result in 'external' impacts, positive or negative, on third parties. These externalities lie outside formal market transactions and no payments or compensation are made for them.   Many uncompensated externalities are associated with the contamination of land, water and air and the destruction of living systems. People affected are made worse off, and their welfare declines. In theory, increased economic activity might provide greater total welfare if the extra benefits of private consumption exceed the extra costs of deterioration in public goods. However, in practice, there are likely to be important distributional and ethical issues (for example some people and communities gain and others lose), temporal issues (cumulative and intergenerational effects), and concern that continued degradation of natural resources and environmental quality will eventually compromise economic activity. Hence, the justification to regulate some aspects of production and consumption, modify the behaviour of one party to protect the interests of another and restrict personal freedoms in pursuit of long term societal welfare: environmental quality being a key determinant of welfare.

Since the early 1990s, most environmental regulation has been delivered through European legislation in the form of Directives to be enacted by Member States. Although initially focussing on individual key environmental concerns, such as nitrate pollution of water and habitat loss, mimicking aspects of the 1990 EPA.   Recent interventions have adopted a more integrated approach. The Integrated Pollution Prevention and Control Directive (IPPC) and the Water Framework Directive (WFD) are examples of such. These regulations will 'capture' some industries and processes that have not been previously regulated, such as IPPC regulation of large pig and poultry units.

It is sometimes stated that around 80% of UK environmental policy is derived from the EU[10]. It would, however, be a caricature to view this as a source 'imposed' on the UK. Much EU law owes a considerable debt to UK initiatives and policies, as is argued in relation to IPPC (UK PPC), Water Framework Directive, etc. It is important to note that without EU environmental law, UK environmental law would be much weaker. This is because traditionally the UK has set objectives (albeit often strong), but with the provision for avoidance if deemed necessary. Concrete examples include:

- Statutory (binding) water quality standards were introduced from the EU;

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[10] See IEEP Manual of Environmental Policy: the EU and Britain.

- EU air limit values are binding, while air quality standards developed independently by the UK are not;

- Sites designated under the Habitats Directive have much greater protection than SSSIs did previously;

- Emission limits for processes such as waste incinerators are binding.

The last 15 years have witnessed considerable expansion in environmental regulatory regimes, reflecting greater knowledge and concern about potential damaging environmental effects. This has placed an increasing administrative burden on the regulator and the regulated such that both parties are seeking ways to achieve 'modern regulation' (EA, 2005) that is effective and efficient, developing regulation methods that are fit for purpose and proportionate to the risks involved (see section 2.3.1).

2.3.1 The driver for better regulation

'Better regulation' is an important commitment by Government that is influencing the work of all Departments. In November 2005 Defra produced its strategy[11] for taking forward better regulation, building on a number of supporting assessments and studies[12] and responding to the initiatives of the Better Regulation Task Force and Hampton Review. The simplification plan is being used to develop a broader 'Better Regulation Implementation Plan' to include the wider Defra family.

The Defra simplification plan maps the administrative burdens resulting from regulation derived from the Department and identifies opportunities for reduction in administrative burdens. An important conclusion of the study is:

'*To do this* [delivering regulation in a least burdensome way] *Defra is actively pursuing the wider better regulation agenda through a more holistic approach, treating regulation as an end-to-end process whose output is not only the regulation, but also the policy outcome being sought*'.

This conclusion stresses the importance of the objectives of policy, i.e. these are what is important, so that efficient, cost-effective means can be adopted. In the context of this report, the stress on a holistic approach to policy making as the means of achieving better regulation is important. In other words not only is understanding better regulation objectives necessary in reviewing Defra's overall policy framework, but a more integrated policy framework is necessary for better regulation.

The 2005 plan already contains many concrete actions for better regulation. Achieving more cost-effective regulation in a number of areas is not, initially, difficult. However, taking the review deeper and developing the analytical tools required for the most effective outcomes for new regulation requires careful readjustment of the policy development process. Critically Defra must address every aspect of the policy cycle through to implementation issues.

Finally, better regulation is also an opportunity. Defra must ensure that 'better' does not just mean 'lower cost'. This is understood within the Department, but not necessarily in wider Government. The focus on objectives of policy is critical, enabling Defra to use the better regulation agenda to require critical examination of other

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[11] Defra 2005. *Lifting the Burden. Defra Initial Regulatory Simplification Plan*.
[12] For example the work by the Environment Agency on modernising regulation, eg *Delivering for the Environment: A 21st Century Approach to Regulation*.

Departmental policy developments in a sustainable development context, such as through RIA.

2.3.2 Providing strategic direction

The most recent EAP "aim(s) to provide strategic guidance and ensure policy coherence, affecting all policy making in the EU[13]" and this is also reflected in the EU Strategy for sustainable development (SDS)[14] which avoids setting targets and deadlines which, is surprising according to ENDS[15] (Environmental Data Services Ltd[16].), given that the previous strategy was criticised for being too vague. However, this seems to be wholly consistent with the "broader attitude to new environmental policy[17]" which is apparent in the published thematic strategies of air quality, waste and resource use. The EU SDS advocates more joined up policy making and makes clear the potential win-win opportunities that exist in environment policy making for example the scope for renewable energy to reduce CO_2 emissions and improvement in air quality (see Box 3 section 2.4.3 - for a contrasting view).

2.4 Domestic policy – gaps and synergies

This section considers briefly and in more detail specific policy areas relevant to the Defra NRP Vision seeking to draw out policy developments and either potential or existing gaps or synergies in policy.

2.4.1 Soils

For many years soils policy was relatively neglected in the UK – it never being quite the focus either of agricultural or biodiversity policy. However, Defra published the first Soil Action Plan for England in May 2004 which set out a programme to improve soil management. Some of the key elements in the Action Plan are:

- To develop a programme of soils education and awareness;

- To work on sustainable use and protection of soils in the built environment;

- To improve the research and knowledge base of soil protection.

A fundamental aim of the plan is to ensure regulation, legislation and policy will provide appropriate protection of soil and empower and encourage people to manage it properly. The Action Plan acknowledges that soil protection cuts across (or involves) actions across a range of Defra Divisions and agencies in the Defra family, and Other Government Departments (OGDs). Thus it lists actions to improve the protection and management of soils within a range of land uses:

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[13] EEA (2005). Sustainable use and management of natural resources.
[14] See http://europa.eu.int/comm/sustainable/sds2005-2010/index_en.htm
[15] ENDS Report 372, p 49.
[16] www.**ends**.co.uk
[17] ENDS Report 372, p 49..

1. Protecting Soils in the Planning System
2. Minimising Contamination of Soils
3. Predicting and Adapting to the Impacts of Climate Change on Soils
4. Soils for Agriculture and Forestry
5. Interactions between Soils, Air and Water
6. Soils and Biodiversity
7. Soils, the Landscape and Cultural Heritage
8. Soils in Minerals Extraction, Construction and the Built Environment

The core of the plan is focussed on short-term actions and to building a consensus view of what is necessary beyond this and a coalition of partners to drive it forward. The first review of the Soil Action Plan[18] states that the intention was from the outset to produce a more strategic proposal on a soil protection policy in 2007 with a longer forward vision and with greater ownership of actions by other partners. The review reports that Defra and its delivery bodies have been working together to deliver the Plan with additional resources secured to fund the delivery of the sustainable soil management objectives. Defra is aiming to embed soil protection into those national, regional and local procedures which will influence outcomes (see East Midlands Regional Assembly case study in Appendix 2). In particular, Defra indicated actions relating to the use of cross-compliance and agri-environment in soil protection, working with DCLG (Department for Communities and Local Government) on developing procedures and English Nature to examine soil protection within protected areas. These actions will move soil protection forward, as will implementation of current protection measures (e.g. within PPC). Natural England and Local Government will have a key role to play in building partnerships to improve the delivery of soil protection, e.g. among planners both at the regional strategic level and at the more detailed local level where they deal with applications to develop for example, mineral extraction.

The review identifies that there is a need to shift the focus of research funding from more traditional research areas, e.g. agricultural soil protection to other areas requiring action e.g. planning and the built environment to ensure a holistic approach to soil protection. Key new areas of research have been identified as the economic valuation of soil functions, the social function of soil and soils in the built environment.

The Soil Action Plan and its proposed development provides an excellent framework for the protection of this natural resource but there is a clear opportunity to focus on achieving targets in a holistic way. For example, under the impending Soils Directive it is necessary to ensure soil resources are protected and sustainably managed, which has implications for improving water quality under the Water Framework Directive (as sediment is a key vector for the loss of much diffuse pollutant e.g. particulate P and N). Actions therefore need to be capable of demonstrating their relevance and benefit to a broader range of relevant interrelated policy pressures such as:

- Further develop the ecosystem services concept in terms of the functions soil provides, e.g. filtering/buffering of water, support to food/fibre production, platform for building etc.

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[18] www.defra.gov.uk/environment/land/soil/pdf/soilactionplan-annrep05.pdf

- Enhancing links between sustainable soil management and water quality - to enable England to meet Water Framework Directive needs (a cross cutting area for Defra)

- Enhancing our knowledge of the links between sustainable soil management/protection and the reuse of organic wastes (e.g. municipal wastes, sewage sludge) on land – to enable England to meet EU Landfill and Waste Directive targets (a key cross cutting area for Defra)

- Consider the implications of Environment Stewardship options for soil quality/health, nutrient pollution/sediment loss, and landscape function.

- To date, soils have tended to be regarded as the 'poor relation' of the three key environmental media, behind water and air quality. Increasingly the need will be to recognise and enhance our understanding of the links and interactions between these three key environmental media.

Finally, it remains to be proven though whether taking forward the Action Plan represents a forum for collation of actions or a true delivery of joined-up decision-making.

2.4.2   Water

Diffuse (non-point source) pollution comes from a range of sources. Run off from road transport, urban activities such as car washing, discharges from contaminated land and pesticides from fish farming are important contributors. However, the largest source is agriculture, as a source of nutrients, pesticides and sediments. Thus agriculture is, for example, responsible for about half of the phosphorus in surface and ground waters (with domestic point sources, sewage and waste water, being responsible for much of the rest).

Defra has taken diffuse pollution seriously, not least because tackling the problem will be a major challenge to meet the environmental objectives of the Water Framework Directive. Some concrete measures have been introduced, such as on catchment sensitive farming. Defra and the EA have some instruments available to deal with some diffuse pollution sources, not least the use of cross-compliance and agri-environment schemes to encourage measures that reduce nutrient/pesticide inputs and protect water courses (e.g. use of buffer-strips). The development of the Whole Farm Approach (a Defra initiative) to regulation will also deliver benefits.

However, even with this new emphasis on diffuse pollution gaps remain. It firstly remains unclear how far the new approaches in agriculture will reduce the diffuse pollution problem (see Box 2) and, where problems remain, what powers and measures will be necessary to be introduced. Secondly, even though there is significant work on issues such as sustainable urban drainage, urban diffuse pollution remains a significant problem (due to historical infrastructure reasons). There is, therefore, a further gap between policy objectives and environmental delivery.

Box 2 – diffuse pollution, water quality standards – an integrated approach

The WFD aims to deliver 'good' water by 2015, across the EU. Generally, it is presumed that 'good' farming practice' will deliver 'good' water. However, all the evidence indicates a much more fundamental challenge faces the main arable regions of Europe: to ensure all waters become 'good', it may prove necessary to change practices or even land use on much arable land.

Taking East Anglia as the example, from 50 up to 250 mm water drains from the land each year. Average drainage is around 150 mm. For potable groundwater to meet the EU Drinking Water Directive nitrate limit in water (50 mg/litre at the tap), the nitrogen (N) that leaches with this water must be no more than 28 kg/ha, 15 kg/ha on average, and less in dry years. Yet the evidence from many years of research shows that annual cropping, in whatever form, leaches on average about 40 kg/ha (Goulding, K.W.T. (2000). Thus groundwater catchments composed totally of arable farming are incompatible with the limit unless treatment or blending of the water is carried out to reduce the concentration. The current amount of nitrate leaching could have implications for compliance with the Water Framework Directive and is arguably not sustainable.

Even if arable crops received no N fertiliser or animal manure, average nitrate concentrations in water draining to groundwater would still be *much* more than (about double) the Drinking Water limit over most of eastern UK. Organic farming is little different from conventional farming in this respect (Stopes, C et al., 2002). The main problem is that cultivation causes nitrate release, and renders land bare of plants, so N cannot be re-absorbed quickly.

The land use that best minimises nitrate in water is unfertilised grass. Water draining from unfertilised grass averages at much less than the 50 mg/litre nitrate limit. However, this only applies if the land is never re-cultivated – 20 to 50 kg/ha N is deposited on most land every year from the atmosphere – so unfertilised grassland continues to accumulate N in soil organic matter. This large quantity will be released over a number of years, mainly as nitrate, if the soil is ever re-cultivated.

Given the technical evidence for incompatibility between arable agriculture and low nitrate (Beaudoin et al., 2005, Goulding et al. 2000, Goulding 2000, Lord et al. 1999) it is clear that integrated water management will be needed at the catchment scale, and that extensive changes in land use must be considered. For instance, some arable catchments may need to halve cropped areas, permanently. Whilst 'good practice' must be promoted, the evidence is that the nitrate debate should be seriously considering both land use options and water quality standards. To what extent should arable land in Europe be constrained from food production, or production of bio-fuels? What are the wide-scale, low-nitrate land uses that might be preferred to food production? Perhaps plantations for bio-energy production, or extensive grassland for leisure, or prairie-type grazing? Can we envisage that some arable land will never again be needed for annual cultivation? When we define 'good' water, and deem it to be a public 'right', should we be influenced by what it will cost? How frequently is it acceptable to have surface and ground waters with more than 50 mg/litre nitrate? Are we prepared to accept the economic and social effects of widespread changes in land use on rural populations, and on landscapes? What scope is there to set different water quality standards in different regions?

Source: Prof. R. Sylvester-Bradley, ADAS, Roger.Sylvester-Bradley@adas.co.uk

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2.4.3 Air

The Government's Policy for air protection comprises the following broad elements:

- Setting objectives for ambient air quality requiring local authorities, etc, to take measures to meet these.

- Controlling stationary air pollution sources – to meet both local air quality objectives and wider objectives to reduce acidification and eutrophication.

- Controlling mobile sources through controls on vehicle performance and emission limits.

- Restrictions on fuel quality to contribute to controlling mobile emissions.

- Additional measures (eg monitoring, EPAQS, etc) to support air quality policy.

Much of the delivery of air quality objectives is achieved through Defra and its agencies, although those on vehicle emissions are led through DfT. The primary strategic approach for Defra action is the National Air Quality Strategy.

In general, the UK has made very little use of economic, or market-based, instruments for air pollution control. Air pollution policy has included the discretionary grants made by local authorities to householders installing new equipment in smokeless zones, and the tax differential in favour of unleaded petrol.

Air limit values: these derive from EC Directive 96/62 and daughter Directives and have established binding limit values for SO2, NO_X and NO2, PM10, lead, benzene and non-binding objectives for ozone and arsenic, cadmium, nickel, mercury and PAHs (Polycyclic Aromatic Hydrocarbons).

Control of air pollution stationary sources is delivered largely through PPC (see industry theme description in Annex 1) and local authority air pollution control measures. Under PPC operators have to operate their installations according to Best Available Techniques, which will provide an overall reduction in air pollution. Importantly, there is also a requirement to ensure that EC air limit values are complied with.

Stationary sources are also controlled to deliver wider reductions on pollutant deposition (acidification and euthrophication). Currently this is driven by the National emission ceilings Directive (2001/81): this sets UK national emission ceilings for sulphur dioxide (SO_2), nitrogen oxides (NO_X), volatile organic compounds (VOC) and ammonia (NH_3). The limits are no stricter than those derived from international obligations (UNECE). The primary aim is to reduce acidification and euthrophication, although there are also knock-on benefits for ambient air quality. It is expected that existing measures will meet these requirements.

Policies on air protection clearly aim to contribute to the provision of clean air to breathe. Policies address the main pollutants that affect human health. There is evidence that health effects remain even if current policy objectives were to be achieved. Thus policies contribute to, rather than achieve clean air; moreover, measures to address clean air have potentially exacerbated other policy areas such as climate change (see Box 3).

Box 3 – environment policymaking is complex – air quality and climate change

A recent report from the Air Quality Expert Group (AQEG) illustrates the complex nature associated with environment policymaking, potential synergies with other policy areas and need for a joined up approach. The report studies a number of different air pollutants (including particles, oxides of nitrogen (NO_x) and ozone) and their relationship with climate change and the impact of measures taken to abate them. Amongst a range of issues raised the AQEG gives examples of how air quality measures can exacerbate climate change e.g. flue gas desulphurisation can increase CO_2 emissions from power stations by up to 2% and fitting particle traps to diesel vehicles can increase CO_2 by up to 5%. Reducing NO_x emissions from vehicles using selective catalytic technologies could benefit climate change by reducing NO_2 and ozone emissions and air quality, but it could also increase emissions of N_2O a greenhouse gas that may offset these benefits.

The report describes how a warmer climate will result in higher emissions of bio-genic volatile organic compounds (VOC's) such as isoprene, which are ozone precursors. Trees account for about 11% of the UK's VOC emissions but these are predicted to rise with temperature increases. Tree planting policies, including carbon offset schemes, do not take account of this and it is possible that increased VOC emissions could offset the carbon benefits of such tree planting.

There is scope for synergies, for example the potential for changing fuels such as the switch from coal to gas to heat households resulting in a reduction in CO_2, SO_2 and particles; the increase in renewable forms of energy such as wind and tidal power are likely to benefit both climate change and air quality, although again there may be trade offs in terms of the potential impact of infrastructures on the landscape and biodiversity..

Source: Air quality and climate change: a UK perspective (www.defra.gov.uk)

2.4.4 Biodiversity, habitat protection and conservation of genetic resources

Species protection takes many forms in the UK. The strongest is legal protection, but protection through policy, such as the UK Biodiversity Action Plan, is also important in driving the work of agencies and NGOs. The legislation in the United Kingdom provides for the protection of certain species of wild plants, birds and animals at all times; some species of bird are protected at certain times of the year only, while certain methods of taking or killing wild animals and birds are prohibited. Legislation for the protection of wild animals is contained primarily in the 1981 Wildlife and Countryside Act (Schedules 5-7). In England and Wales enforcement provisions were extended and some amendments for protection made by the Countryside and Rights of Way Act 2000 Section 81 and Schedule 12. There is also specific legislation for badgers, whaling and seals. The protection of European animal species in Great Britain is covered by the Conservation (Natural Habitats, etc) Regulations, 1994, Part II, Regulations 38-41 and Schedules 2-3.

Having said this, the protection afforded to species is mostly focused on rare species, while the objectives of major policy initiatives (such as the BAP) is also about the enhancement of biodiversity generally outside of protected areas (not simply rare species protection). However, some species declined rapidly (such as some farmland birds). Although policies have been developed to improve species protection outside of protected areas, this remains an area for further analysis and policy refinement.

2.4.5 Marine

Marine protection presents major challenges to Defra and its agencies, not least due to an incomplete and fragmented management / regulatory framework. It should also be noted that competence in an important area (fisheries) has been largely transferred to the EU level (see fisheries section).

It must be recognised, however, that marine protection policies are currently in a state of flux in the UK, not least with the development of the Marine Bill, but also with the proposal for a Marine Strategy Directive by the European Commission. The latter would require identification of a competent authority for marine waters that would help crystallize marine management.

Defra has undertaken significant preparation for the Marine Bill and this provides an example of good practice in policy making. Firstly, Defra has funded significant research to assess the changing status of the seas and pressures on them, including studies on:

- Impacts of activities such as aggregate extraction and wind farms;

- Accidental marine pollution management;

- Marine spatial planning issues;

- Endocrine disrupters in the marine environment;

- Ecological processes in the marine environment; and

- Monitoring and assessment of our seas.

An analysis pulling together these issues was published in 2002 as 'Safeguarding Our Seas'. Importantly this stated that future marine management would be based on an ecosystem approach, through the principles of sustainable development, integrated management, the conservation of biological diversity, robust science, the precautionary principle and stakeholder involvement. The report outlined current regulatory issues and set the foundation for extensive stakeholder discussion on relevant issues.

This report was followed-up in 2005 with 'Charting Progress'. This particularly focused on the results of marine monitoring to identify whether progress on different issues has been acceptable, unacceptable or has room for improvement. While it identified that there are still significant uncertainties, Defra is confident that the major threats are identified. A Marine Monitoring Co-ordination Group, made up of representatives from the current monitoring Sectors, various Departments, Agencies and the Devolved Administrations was also set up to consider marine monitoring, including a clearer definition of roles and responsibilities.

As a result of this analysis the details of the Marine Bill were developed. It includes the following elements, which seek to address the deficiencies identified:

Marine Spatial Planning: to improve the current system and set priorities, guidance and environmental standards for the development and protection of marine resources.

- Marine Consents: the current overlapping regime involving different Departments and agencies will be streamlined.

- Marine Management Organisation: consideration is being given to a new Marine Management Organisation.

- Marine Nature Conservation: examination of improved legal protection for marine biodiversity.

- Coastal and Estuary Management: developing a strategy for integrated coastal zone management.

- Fisheries Management and Marine Enforcement: examination of a new approach across the UK for combining fisheries and marine resource management.

It can be seen, therefore, that while there are significant gaps and conflicts in policies relating to marine protection, Defra has analysed these in a significant, evidence-based and co-ordinated approach to proposing new policies. This represents good practice in policy making.

Fisheries

There are inevitable conflicts between the implementation of fisheries policies in the UK and wider environmental objectives. This fundamentally boils down to the fact that competence for fisheries in wider territorial waters is under the European Community and expressed through the Common Fisheries Policy. The CFP (in detail) is not yet as Defra would wish it to be and, in particular, is not delivering sustainable fish stocks. There can also be other interactions. For example, the most endangered species (such as tuna and cod) are often the most energy intensive to harvest – thus measures to protect such stocks could be consistent with control of greenhouse gas emissions.

Inshore fisheries also has a number of conflicts. Management by the Sea Fisheries Committees has been criticised as being focused on a single stakeholder (fisheries). However, there are significant improvements in bringing together different interests. Tensions do remain, such as:

- Conservation of marine environment interests through the EU Habitats and Birds Directives and Special Areas of Conservation;

- Coastal Zone Management under local authorities – a Defra report in April 2004 highlighted the multiplicity of actors in coastal management and the need to harmonise approaches;

- Planning permissions for the inter-tidal area;

- Finfish aquaculture – aquaculture can adversely affect fisheries in a number of ways, such as localised pollution;

- Wind farms and aggregate dredging – where there can be simple conflicts of land-use and effects of construction.

2.4.6 Managing flood risk

Flood defence is the responsibility of different organisations:

- Maintenance of flood defence is generally the responsibility of riparian (the interface between land and a flowing surface water body) owners, unless one of the operating authorities has accepted responsibility for them.

- The Environment Agency has permissive powers to carry out works on designated main rivers, sea and tidal defences.

- 245 Internal Drainage Boards (IDBs) may carry out works on ordinary water courses in certain low lying areas and are concentrated in East Anglia, Yorkshire, Lincolnshire, and Somerset.

- Local authorities have permissive powers to undertake flood defence works on ordinary water courses which are outside the IDB districts, and to reduce flooding from the sea (at a non-strategic scale.)

The current management approach for flood defence is fragmented. Thus there are often different organisations responsible for flood defence, coastal defence, environmental protection and land use. For example, hard flood defence construction can conflict with biodiversity protection, while managed realignment can lead to the creation of new wetland habitats. Considerable efforts have been made to bring these elements together, but this still does not result in optimum outcomes. Thus although there is significant work by EA and EN on better management of flood plains and on improving coastal defence through managed realignment, local authorities still allow construction in at-risk areas and there is considerable resistance to alternative management approaches.

The Water Framework Directive implementation will help improve this situation as this encourages a river basin approach, including flood management. However, it remains to be seen if this will truly help integrate decision-making or simply provide a forum for the annunciation of conflicting views. Integrated Coastal Zone Management Strategy also provides an improved focus for coastal defence in the light of wider environmental and social objectives.

2.4.7 Access and recreation

The CROW Act is a key piece of legislation that provides new opportunities to access the countryside in England. The Rural Development Regulation – Pillar 2 of the CAP and the associated agri-environment schemes, for example the HLS, will further benefit access to the countryside enabling landowners to enhance footpaths, cycle-paths, address mobility constraints and so on. The relationship between rural and urban areas, and notably the role of the rural urban fringe is recognised by the Countryside Agency (now part of the Natural England Confederation) as an opportunity to address neighbourhood decline, meet the need for new housing through the regeneration of land the key government polices include the Regional Spatial Strategy, Local Development Frameworks and Community Strategies.

Of particular importance in urban areas are green spaces that have had a renaissance in recent years with the growing recognition of the role such areas have in contributing to improvements in quality of life, health and improved environment. The Clean Neighbourhoods and Environment Act (2005) will contribute to improving poor environmental quality the emphasis being for local authorities and related stakeholders including civil society to instigate change[19]. The role of green gyms is gaining prevalence[20] and Defra should consider how policy could be used to develop further this concept.

2.4.8 Sustainable food and farming

The 2003 CAP Reform de-coupled subsidy and production and evidence suggests that this has removed many of the more severe adverse impacts associated with CAP. The 2000 CAP reform introduced 2 pillars of CAP – Pillar 1 is the traditional form of subsidy aimed at supporting farmer incomes & maintaining high prices for

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[19] This is recognised in the Home Office publication National Community Safety Plan
http://www.cleanersafergreener.gov.uk/images/National%20Community%20Safety%20Plan_257.pdf
[20] see http://www.sd-commission.org.uk/communitiessummit/show_case_study.php/00079.html for example

produce regardless of environmental consideration. Pillar 2 is the agri-environment and rural development measures. The current budget is split 90:10 in favour of Pillar 1 and, although the steps taken have started to de-couple subsidy with production this will not in itself lead to environmental benefits unless it is a consequence of market forces or unless there are other incentives e.g. grants.

Agricultural pollution, particularly diffuse pollution, is traditionally much less tightly regulated than industrial emissions. Defra has acknowledged that diffuse pollution is still not adequately dealt with, but that this will have to be addressed to meet the requirements of the Water Framework Directive (WFD)[21]. Control of pollution from agricultural sources is via the general pollution control legislation framework e.g. Water Resources Act, Control of Pollution Act. There are widely acknowledged flaws in this, particularly in the control of non-industrial emissions (e.g. from agriculture), not least because the financial penalties for offences are insufficient deterrent, and due to the burden of proof for diffuse pollution.

Defra's agri-environment policy is provided by the Sustainable Farming and Food Strategy and delivered primarily through the ERDP. The key ERDP measures in respect of biodiversity are Environmental Stewardship (incorporating the Entry Level Scheme (ELS), the Higher Level Scheme (HLS) and Organic Entry Level Stewardship (OELS)).

ELS is broad & shallow and intended to bring wide ranging multiple benefits to the wider countryside for relatively little investment. HLS is deep & narrow, and the benefits it can bring are much more pronounced. However, it is more resource intensive, and hence in the existing funding framework can only be adopted in areas where the benefits of this investment will be greatest. It is not feasible to apply an HLS type scheme to the wider countryside, and hence to be successful ES must successfully balance ELS and HLS. Funding of agri-environment schemes under the ERDP is primarily through the re-direction (modulation) of funds from CAP Single Farm Payment allocations. European rules however restrict this, and at the moment, the maximum proportion of funds envisaged is 20%.

Agri-environment and biodiversity

ES is tied in with the Biodiversity Action Plans (BAP) process, and many of the options are designed to link in with BAP habitats & species targets. Around half of all species action plans (SAPs) and habitats action plan (HAPs) identify the impact of agriculture as a major issue and 15% of HAPs and SAPs deal exclusively with agricultural land. BAP actions for these largely rely on the agri-environment schemes to deliver the anticipated benefits. There is some evidence[22] to suggest that agri-environment schemes have been instrumental in reversing the decline of several bird species, including Cirl Bunting & Stone Curlew, both National BAP species. However, it is not clear whether this is replicated for non-BAP species.

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[21] ENDS Report.
[22] (EN 2004, Defra 2004), although work by Kliejn D and Sutherland WJ (2003) reviewing 62 evaluation studies of agri-environment schemes taken from across Europe (although skewed to the Netherlands and UK which made up 62% of the evaluations studied) concluded that "in the majority of the studies, the research design was inadequate to assess reliably the effectiveness of the schemes". In: How effective are European agri-environment schemes in conserving and promoting biodiversity? Journal of Applied Ecology, 40, 947 – 969.

Box 4 – broadening the scope of agri-environment policy

Innovation techniques: diffuse pollution and nature conservation in non-Environmentally Sensitive Areas are acknowledged as weaknesses in the existing framework although the Water Framework Directive and Environmental Stewardship are respectively intended to address these deficiencies. However, technological advances in agriculture, such as bio-control of pests, genetic engineering and improved matching of crop type with local conditions to reduce the need for irrigation, pesticides or fertilisers have great potential to reduce the impact of agriculture in the long term (Scherr & McNeely, 2002), although as yet there are few examples that could be applied at a commercial scale. However, the policy framework is not well adjusted to respond to such innovative developments – the focus is more on minimising the impacts of traditional agricultural techniques.

Market focused initiatives: voluntary, market focused methods such as Environment Management Systems, Corporate Social Responsibility and Corporate BAPs (Biodiversity Action Plans) have been instrumental in driving the environmental performance of other business sectors. These are still infrequently applied in agriculture and where they are this is often due to external drivers e.g. the consumer pressure for these initiatives falls mainly downstream of the farm gate e.g. Unilever Ice Cream & Frozen Foods – the leading UK producer of frozen peas through its Birds Eye brand – has been working with farmers, researchers and NGOs since 1998 to promote sustainable agriculture in pea production (http://www.unilever.com/ourvalues/environmentandsociety). Unilever is now extending the best practices identified on these farms to all of their 420 UK pea growers. A Forum for Sustainable Farming has been set up to help implement this. This group is helping to develop and communicate Unilever's Sustainable Agriculture Programme. The potential of these tools in agriculture is great, but it will need incentive for farmers to adopt (in 2003 Unilever invested about £50 000 with additional funding in 2004 from the Vocational Training Scheme and the European Agricultural Guidance and Guarantee Fund).

Displacement: If changing trends in agriculture in the UK increase our reliance on imports from abroad, then are we effectively just displacing environmental impacts elsewhere (plus introducing a new impact in the form of extra food miles). This is not well addressed by the existing policy framework. In reality, the impacts abroad may be greater than the impacts associated with producing the same food in the UK due to the weaker regulatory systems that exist elsewhere, particularly in developing countries.

Statutory back-up: the existing policy framework is focused on voluntary action backed by financial incentive. It has been suggested that the BAP process cannot achieve its potential without statutory enforcement, and it could be argued that this is also true for agricultural biodiversity initiatives. However, Defra's position is that the degree of regulation required to achieve the desired benefits would be unreasonably demanding to farmers, and hence this is not seen as a realistic solution.

References

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2.4.9   Planning

The UK spatial planning system has mainly been concerned with conservation of particular characteristics of urban and rural landscapes. The need to protect the English countryside, for example, is deeply embedded in the system. The metropolitan greenbelt was promoted as a lung for Londoners (Ward, 1994). Recent post war development regimes, cast the city in a paternalistic role overseeing 'mother nature' as provider of food and energy supplies and building materials. Indeed, Abercrombie (1944), with allegories that might now be regarded as dated, patronising and somewhat tainted, argued that the city 'as an adult male' should take on the moral duty of care and stewardship for the environment as a husband should to his wife.

However, Healy (2006) notes that such conceptions are a long way from the range of new biospheric concerns that require response from the UK spatial planning system. These include: the environment as a stock of assets; environmental systems and carrying capacities; the environment as our world; the environment as cultural conception. It is clear, from Abercrombie's and Healey's take on the environment that views vary over time and space. It is critical however, that the views from one period, however appropriate, embed themselves in immovable planning regimes that act as barriers to beneficial change in another very different period.

Spatial planning in the UK is largely regulatory in nature and tends to focus upon demand management. The planning system may be seen as a set of institutional arrangements for the resolution of competing interests. There is a need to develop a new vision for spatial planning in the 21st century. While the achievement of sustainable development is detailed within PPS 1 as providing a central vision for spatial planning, there are concerns that the concept of sustainable development is too broad, flexible and lacks meaning in practical application. In this regard the need to maintain stocks of natural capital in order to ensure ongoing provision of ecosystem services may help to give expression to sustainable development within the UK spatial planning system.

However, the ability of the planning system to develop and deliver a new vision for the 21st century must be called into question. Institutions such as the UK planning system show similar characteristics to technologies in that they are subject to increasing returns to adoption and thus become 'locked in' and inflexible. For the most part the UK planning regime is very good at preventing development but much less effective in facilitating it (Cullingworth and Nadin, 2006) For example, some would argue that planning for rural areas has been characterized by restraint and combined with strong support to agriculture, prevented alternative land use and enterprise in the countryside. The reduction of production and income support to farmers has exposed the rural sector to a vulnerability borne of over dependency on a single, highly subsidised sector. Comparative research on planning in Europe also highlights the lack of positive planning in the UK (Williams and Wood, 1994).

It is increasingly recognised that the UK spatial planning system is failing to deliver sufficient housing or protection of ecosystem services. It inadequately accounts for the ecological footprint in the design and the location of new housing development. The inability of the planning system to prevent construction of at-risk housing in flood prone areas, in spite of PPG25 (Planning Policy Guidance 25: Development and Flood Risk), is a case in point. It is apparent that the planning system does not demonstrate evidence of ecological learning that informs management and governance. It seems to demonstrate all the signs of institutional 'lock-in', serving the vested interests of key stakeholders, including powerful government agencies, rather than adapting to the new realities. Incrementalism does not appear to be working: it may be time for a systemic radical review.

2.5 Developing a policy framework

Following the World Summit on Sustainable Development (WSSD) in 2002 the UK government published a Framework for Sustainable Development and Production and, more recently the Sustainable Development Framework (Securing the Future, 2005). Securing the Future sets out social, economic and environmental aspirations and objectives for the UK and the associated policy cascade (Figure 1) to support their delivery.

Arguably though whilst Securing the Future lists and acknowledges the range of natural environment policies for the UK (international, EU and national) there appears to be little acknowledgement of the potential interactions between policies and their interdependencies although the role of agricultural policy and planning guidelines do get special mention in terms of their potential to enhance and protect the natural environment.

EU

International Treaties

UK Government
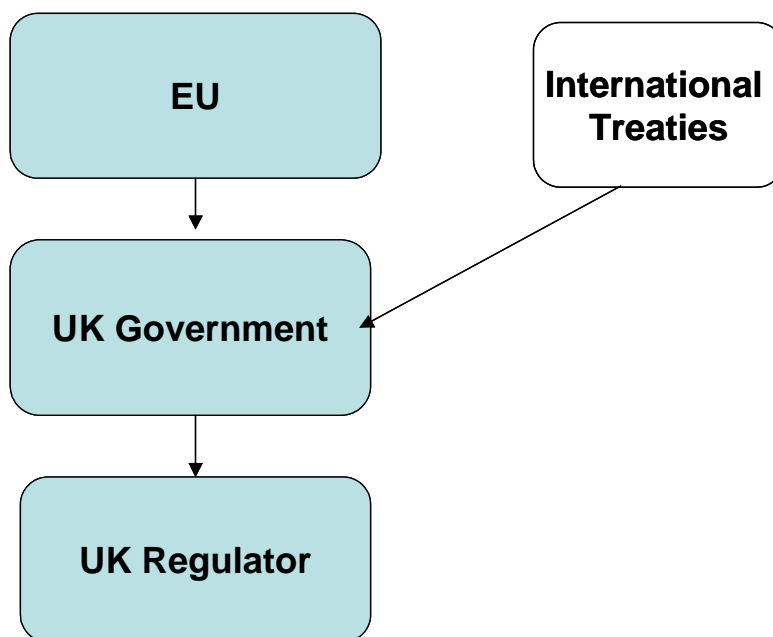
UK Regulator

Figure 1 The policy cascade

2.5.1 Natural environment policy – reactionary and remedial

The main approach to regulation can be described using the DPSIR framework, now widely used by developmental and regulatory bodies such as the European Environment Agency, the Organisation for Economic Cooperation and Development, Environment Agency, and Defra (EEA, 1999). Originally, the framework comprised pressure-state-response, but was subsequently extended to include drivers and impacts: the latter because it is risks to people and living systems that is of main (political) concern and that which justifies policy intervention; the former in recognition that it is broad societal motivation and systems of governance that generate pressures associated with human activity, with consequences for the 'state' of the environment.

The framework is useful because it can help to identify cause and effect relationships, allowing for the separation of resource allocation issues through the different DPSIR categories, which are defined as:

- driving-forces, which are the socio-economic causes underlying environmental pressures, for instance these driving forces could be urbanisation or industrial demand for natural resources;
- pressures, are activities that affect the state of the environment, such as polluting emissions to the atmosphere or water abstraction;
- state, is the condition of the environment in terms of the quality and quantity of natural resources;
- impact, is the effect that a change in the state of the environment has on human health, welfare and biodiversity;
- response, is a management option such as, law, programmes and research that target one or more points in the environmental change process in order to mitigate damage/problems, or re-orientate drivers/pressures.

The DPSIR framework provides a structure for policy design with responses targeting the various elements of the framework. Figures 2 provide examples for UK agriculture. High level drivers, including the production oriented Common Agricultural Policy, have promoted intensive farming leading to a deterioration in the state of the rural environment, with consequences for people and wildlife. Responses have taken a number of forms: either attempting to 'modify' drivers, 'alleviate' pressures, 'protect' states and 'mitigate' impacts.

Figure 2.   DPSIR Policy Framework for UK Agriculture

The DPSIR framework demonstrates a policy continuum, from modification (mainly proactive, preventative and enhancing) through to mitigation (mainly reactive, curative and protective).   It also confirms that most regulatory measures have been predominantly reactive and remedial.   These are likely to be less effective and efficient in the long term than those that address key drivers, because they do not address the origins of the regulatory problem. They are also likely to need constant revision in the face of changing drivers and the avoidance strategies of regulated parties. By comparison, policies that address high level drivers such as patterns of consumption, although likely to be more effective and efficient in the long term, require fundamental changes in social motivation and governance systems. These go well beyond the environmental brief. This has two implications for environmental policy: (i) in the absence of a paradigm shift in societal motives, environmental policy is always likely to be reactive to the negative effects of development policy, and (ii) proactive environmental protection can only be achieved if environmental objectives are built into key areas of macroeconomic policy, such as transport, energy, agriculture, and trade.

Responses include choice of policy instrument: whether mandatory regulation, voluntary agreement, economic instruments, or other actions such as advice or

research and technological development. Criteria for choosing instruments include effectiveness, incentive for continual improvement, efficiency, fairness, administrative feasibility and acceptability to dominant interests groups. But it is difficult to generalise which instrument will be most appropriate without reference to, for example, the characteristics of the polluting activity or substance (e.g. potential toxicity, physical form), its source (point or diffuse), and the type and sensitivity of the receptor (e.g. water, actual toxicity).

Whilst the regulatory approval of agrochemicals is very prescriptive the general approach to diffuse pollution derived from the application of products, largely relies on stewardship and the promotion of best practice, rather than through the imposition of mandatory regulations that are difficult to enforce. Where there is a strong link between a practice and damage to a sensitive receptor, however, a regulatory framework has been adopted. Examples include the Nitrates Directive that limits application of N fertiliser in N sensitive areas and the IPPC Directive that requires pig farmers above a given threshold to cover slurry lagoons to limit ammonia emissions to atmosphere.

2.6 Policy process

The policy cascade (figure 1) does not explicitly identify the potential influence of politics on the development of environmental policy, although there can be little doubt that the government of the day increasingly wish to extol their green credentials (for example the current Labour government have placed particular emphasis on climate change). Whilst the underlying reasons that motivate the decision making process in policy making may not always be apparent it is clear that some changes necessary to deliver the outcomes of environmental policy may be politically difficult to achieve, for example the Nitrates Directive sets a limit of 170 kg N/ha as a maximum annual residual. Research indicated that several countries (e.g., Belgium, Denmark, and the Netherlands) would have to decrease residual nitrogen significantly, perhaps by reductions in livestock numbers. Although large reductions in livestock numbers appeared necessary, such reductions were admitted to be "politically difficult to achieve"[23]. The withdrawal of fuel duties[24], originally designed to reduce levels of CO_2 emissions, is another example where political pressure has resulted in a change in policy although as Box 5 illustrates political influence can result in positive outcomes in terms of environment policy.

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23 From Nitrates from agriculture in Europe: the EC Nitrates Directive in England (Margaret Rosso Grossman) http://www.bc.edu/bc_org/avp/law/lwsch/journals/bcealr/27_4/01_TXT.htm

[24] See for example http://news.bbc.co.uk/1/hi/world/europe/925048.stm summarising the withdrawal of the fuel duty introduced by the UK government and concerns raised by NGO's of the consequence of this.

Box 5 – policymaking and politics – rain-acid waters

In the 1950's the government was pre-occupied with urban smogs and the need to reduce air pollution, especially smoke emissions. Mitigation measures introduced in the 1956 Clean Air Acts included the building of new power stations equipped with tall chimneys that may have aggravated the acid deposition problem by dispersing emissions further from their source. Sweden claimed in the 1960's that long-distance transported acidic compounds caused fishery loss in Sweden from industrial countries upwind including the UK. However, the UK's nationalised power utility (Central Electricity Generating Board) was not convinced of the cause-effect relationship between acid rain and fish decline. Despite more than 10 years of research evidence supporting the acid deposition hypotheses the CEGB maintained their rejection of acid deposition as the major cause of the problem and were unprepared to introduce sulphur dioxide removal technology into power stations. By the mid-1980's diplomatic relations between Britain and Norway became severely strained. In 1984 the Department of Environment assumed responsibility for acid rain research following the concern that CEGB and the Department of Energy might be on the wrong side of the argument and damaging the UK's image overseas. In 1985 the CEGB and National Coal Board aware that their in-house and sponsored research was perceived to lack objectivity provided £5 million to fund – the Surface Water Acidification Programme (SWAP) – to the Royal Society and Norwegian and Swedish national science academies. To the surprise of SWAP scientists in 1987 the Thatcher government announced acceptance of the Scandinavian position and made a commitment to reduce S emissions before the SWAP programme had been halfway completed. The change in policy was later attributed to two reasons i) the Head of the CEGB Sir Walter Marshall on a tour of acidified lakes and forests in Scandinavia returned convinced that emissions should be reduced based on the Scandinavian evidence, if only as a gesture and ii) Mrs. Thatcher was in a mood to heed advice realising that resolving this problem would improve her green credentials before the forthcoming general election.

Source: Battarbee R. (2006). The rain-acid waters debate in the UK – a brief history. In The Future of Britain's upland waters. Battarbee R.W., Curtis C.J. and Binney H.A. (eds.). Proceedings of a meeting held on 21st April 2004, Environmental Change Research Centre, University College London. ISBN 1 871275 31 8.

The role of science to support the policy making process is clearly acknowledged by Defra[25] although the process itself of taking scientific advise and distilling it into environmental policy is often messier than the linear model in Figure 3 might suggest.

Figure 3 Modified evidence-based policy model[26]

The natural environment and its various interactions are complex and often poorly understood so that the evidence base is lacking and may even appear unclear which often delays or exacerbates the policy making process (Box 6).

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[25] See for example Defra's Evidence and Innovation Strategy – 2005 – 2008
http://www.defra.gov.uk/science/how/documents/Evidence%20V4%20BOOKMARKED.pdf pg. 9.
[26] Ibid.

Box 6 – policymaking and science – EC Drinking Water Directive and Nitrates Directive

The EC Drinking Water Directive, enacted in 1980 and effective in 1985, established a maximum admissible nitrate (NO_3) concentration of fifty mg/l. Previously, however, a higher limit of 100 mg/l had applied in England; even that level was advisory, and water with more nitrates was not considered polluted. Thus, when the EC Drinking Water Directive took effect, some drinking water sources in England exceeded the maximum allowable nitrate concentration. Much of the excess nitrate reaching drinking water sources came from agricultural land. Water suppliers sometimes had to close high nitrate water sources or blend high and low nitrate water to meet the legal standard. During the 1980s, various groups asserted that no scientific basis justified the lower nitrate standard, and that nitrate levels up to 100 mg/l posed health risks only to infants. The Fertiliser Manufacturers Association and the National Farmers' Union, as well as Regional Water Authorities, objected to the EC standard, while environmental groups and the government's Nature Conservancy Council supported the fifty mg/l limit.

In addition to debate about safe levels of nitrates, considerable scientific disagreement surrounded the identification of causes of rising nitrate pollution in the UK. Various researchers disagreed about the extent of nitrate pollution and nitrate leaching caused, for example, by application of inorganic fertilizers (especially in autumn), application of organic manures, use of intensive farming systems, ploughing of pastures and grass leys, and cultivation of nitrogen-fixing crops. The UK government, perhaps taking advantage of scientific disagreements, was slow to address increasing nitrate levels and tardy in implementing fully the EC Drinking Water Directive. Eventually, despite initial scepticism, farmers and others recognized the health hazards of excessive nitrates and the agricultural contribution to that excess. Even today in rural water catchments in the UK, at least eighty percent of nitrates come from agriculture.

Source: From Nitrates from agriculture in Europe: the EC Nitrates Directive in England (Margaret Rosso Grossman) http://www.bc.edu/bc_org/avp/law/lwsch/journals/bcealr/27_4/01_TXT.htm

As well as the political and scientific dimensions to environment policy making there is the media who can also be responsible for misrepresenting the evidence base[27] (Box 7) and this too may also confound the policy making process[28].

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[27] See Ladle RJ., Jepson P and Whittaker RJ (2005). Scientists and the media: the struggle for legitimacy in climate change and conservation science. Interdisciplinary science review, vol., 30, no. 3. pp. 232 – 240. Ladle *et al.* describe how a study published in Nature forecasting future global extinctions as a result of climate change were widely misrepresented especially in the news media to make the consequences of seem more catastrophic and the timescale shorter. They also cite a report published by the Office of Science and Technology and the Welcome Institute which concludes the UK lacks a framework within which people can access information about new science which allows them to assess and judge information and its implications.
[28] In developing this report we could not find any evidence that directly linked media with natural environment policy development *per se*; however media could well ensure that an environment issue is consistently given a high profile and this may result in policy being developed more quickly.

Box 7 – media misinterpreting the evidence – the case of climate change and plants

The media often pick up on research findings that appear to question the evidence base. For example, in January 2006, Nature published research into methane emissions from trees, which newspapers wrongly interpreted as evidence that plants cause global warming. The discovery that plants are a major source of greenhouse gas (GHG) methane has raised doubts over the use of forestry projects to generate carbon credits. Methane is the second most important GHG and about 22 times more potent than CO_2. Researchers have found that living plants produce methane under normal physiological conditions and estimate that vegetation may release 60 million to 240 million tonnes methane each year. The research might explain the puzzling fall in the growth rate of atmospheric methane levels due to increased deforestation. The research received widespread media coverage much of which suggested that plants are to blame for global warming. The researchers had to issue a statement that emissions from plants are a long-standing natural source and human activities are responsible for the higher atmospheric levels and recent temperature increases.

Source: ENDS Report (2006). Shock finding on methane from plants 'misinterpreted'. ENDS Report no. 372 pp. 21.

2.7 Dependence on local and regional authorities

Government Offices (GO's) and local authorities have played a large role in environmental policy, particularly in its implementation compared to the relatively recently established Regional Development Agencies (RDA) and Regional Assemblies (RA) that have resulted from the devolution process. The RDA's and RA's have the least powers relative to Scotland, Northern Ireland and Wales in so much that they have been given administrative powers only, having no elected forum that can 'pass' legislation at the regional level. Thus, the RDA's and RA's are confined to devising strategy with the notion of sustainable development featuring prominently and, legislation as such, being constrained to national government policy[29]. The relationship with national government Departments seems to have been weakened with the devolution process and environment policymaking remaining largely centralised with regard to the EU[30].

Our observations when speaking to the East Midlands Regional Assembly (EMRA) (Box 8) suggest that, at the local level, there are good working relationships with the Defra family. However the range of stakeholders that EMRA seeks to co-ordinate make management cumbersome with no dedicated budgets to quickly take forward ideas. Interestingly EMRA are not included in many of the Defra consultations and did not see anything connected with the Defra NRP vision; where they did make comments on consultations they did not receive feedback and were not clear therefore whether comments made a difference[31]. These observations are surprising given the "strategic" role that EMRA plays in the region and its influence on a wide

[29] Fairbass J (2004). Wales and environmental policy: exploring the impact of devolution on policy actors, processes and outcomes. Paper presented at WiRE workshop "Devolving responsibility: EU multilevel environmental governance". University of Wales, Aberystwyth, 14th May, 2004. The paper concludes that devolution has resulted in the introduction of new policy actors and that the (environment) policy making process has become slower, more complex, less predictable and more conflictual. Environment policy has become more marginalized at the national level but more inclusionary at the regional level. The sustainable development agenda has gained prominence in the UK and this may elevate environmental policy.
[30] Ibid. and citing Bulmer *et al.* (2002). British devolution and European policy making: transforming Britain into multi-level governance, London: Palgrave.
[31] See annex to this report for more complete notes of meeting with EMRA.

range of stakeholders. Here is a real opportunity for Defra to imbed its NRP vision into regional strategy and work more closely with RDA's and RA's at the senior level as part of the process of mainstreaming and integrating such thinking into social and economic actions.

Box 8 – working more closely with the Regions

The main gaps that EMRA (East Midlands Regional Assembly) perceives impact on natural resource protection are:

- Soils information: this is being addressed through a recent project;
- No biodiversity co-ordinator in EMRA;
- Further work could be developed on the importance and role of green infrastructure;
- Environmental capacity – a Strategic Environment Assessment approach is required to identify the balance of needs. EMRA cited the recent DCLG Planning Policy Statement 25 Development and Flood Risk consultation (closed February 2006) that aims to ensure that flood risk is properly taken into account in the planning of new developments. The document does not include any reference to soil, erosion and the subsequent impacts on ecosystem services yet soil, its properties and its management could be critical in the management of flooding.

Source: Interview with EMRA

The dominant theme for regional authorities is to grow the economy in the area and there is a perception that the environment will get in the way (*although in some areas of natural beauty it is recognised that the natural capital is an important economic asset*). Through agreements with the wider Defra family at the local level (e.g. English Nature, Environment Agency) local authorities are able to source technical advice to support environment policy implementation and the relationship at this level is considered good. Missing is the strategic engagement between Defra and the Chief Executives of local authorities which seems to be a potential weakness in mainstreaming the Defra NRP vision and also influencing buy-in associated policy areas. Regional Spatial Strategies; Regional Economic Strategies and Local Area Agreements are the key policy documents used by regional and local authorities in planning and prioritising social and economic development in the regions and these provide. Going forward there is a need to ensure that these are consistent with the Defra NRP vision.

Source: Interview with Defra (Local and Regional Government Division)

To support decision makers, planners and developers working in the region EMRA supported the development of the East Midlands Integrated Toolkit (EMIT)[32] to evaluate their plans, policies and projects on the region's sustainable development objectives. The toolkit covers sustainability issues such as climate change impacts, protection of the rural landscape, health impacts and social equity issues and aims to provide information to help activities in the region contribute towards an improved and sustained sense of human well-being. The toolkit is different to policy instruments such as the Regulatory Impact Assessment (RIA) in so much that it focuses on defined sustainable development objectives (of the region) and provides regional and national summary policy documents covering all areas within the region's sustainable development objectives; a range of questions to help policy makers and advisors decide whether they are helping to achieve the regions objectives; elements of sustainability, health impact and inequalities assessments, environmental impact, rural proofing and climate change proofing. Defra may wish to consider the benefits in

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[32] A complete description of the EMIT is available at http://www.emtoolkit.org.uk/toolkit/index.php

developing a similar tool focusing on the NRP vision to assist policymakers and decision makers in developing and implementing policies consistent with the vision.

2.7.1 River basins and catchments – a fourth tier to consider

As such there are no catchment based organisations that are recognised in state constitutions although the EA has adopted river catchment boundaries for all its internal operations and externally the public-facing boundary is based on District and County boundaries which form the closest fit of the catchment boundary[33]. Despite the apparent lack of catchment based organisations in the UK a fourth "tier" with regard to natural resource management is emerging around the River Basin and associated catchments as a consequence of the Water Framework Directive. Undoubtedly there will be an additional burden on administrators and managers and the requirement for strong communication across the different government administrations that fall within or cross over catchments. Arguably, as natural resource based research and development organises itself around catchment based principles so the evidence for broader and spatially integrated planning will be even more compelling. Furthermore, some natural resource problems often manifest themselves downstream from the source of the problem and therefore inevitably stakeholders will have an interest in co-ordination across boundaries to address the issue[34].

Zammit *et al* (2000)[35] working in Australia recognise that as the "fourth tier" gains prominence fostering greater integrated management so there is also "likely to be inter-agency tensions". They go on to say, "the goals of a catchment committee might also clash with those of a local authority, especially in relation to land and water use". If, and it is unclear at the moment in the UK, the flow of funds goes to support the work of catchment groups this may be of concern to local authorities who may perceive to be loosing out.

With the introduction of River Basin Plans as part of the WFD there is a risk of greater confusion since there is already an abundance[36]. There is a real opportunity that Defra should consider using the forthcoming River Basin Plans as the basis for integrating the range of environmental goals targeting natural resource management into one single coherent document.

2.8 Summary

- Environmental policy and its interactions are complex (but should not be a reason for inaction; in the past a poor understanding of the relationship between

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[33] see http://www.defra.gov.uk/environment/consult/eafman/09.htm. However, "the Modernising Government White Paper commits Government to work to re-align the boundaries of public bodies. The White Paper states that Government will work from a presumption that the regional geographical boundaries of public bodies should be aligned, at a regional level, to those of the Government Offices for the Regions whenever they next review their administrative, managerial or delivery arrangements and structures. Exceptions to this rule will only be made where there are strong over-riding considerations". There may be a case for organising the EA externally around catchment boundaries given the demands of the Water Framework Directive, however, any change will be subject to the performance of the EA against its duel system of organisation which may be deemed to be sufficient.
[34] For instance, in October 1998 flooding on the River Severn moved progressively from mid-Wales via Shropshire to Gloucestershire. Ibid.
[35] An outcomes-based framework for evaluating natural resources management policies and programs. C. Zammit, G. Cockfield and S Funnell. Land and Water Australia, Social and Institutional Research Program,. Project No. 6.250/USQ3.
[36] The Royal Commission on Environmental Pollution highlight the many environmental aspirations in the present planning system and that the many goals formulated for the environment have not been assembled in single document; see http://www.rcep.org.uk/epreport/08chap4.pdf

environmental media often led to policies being developed in isolation. The scientific understanding of the interactions between different environmental media is still poorly understood. However, new cross-cutting policies and strategies require demand a better understanding of the relationships between environmental media and research needs to be directing in addressing filling this knowledge gap. Figure 3 illustrates the interacting policy influences on Defra and in the development of natural environment policy;
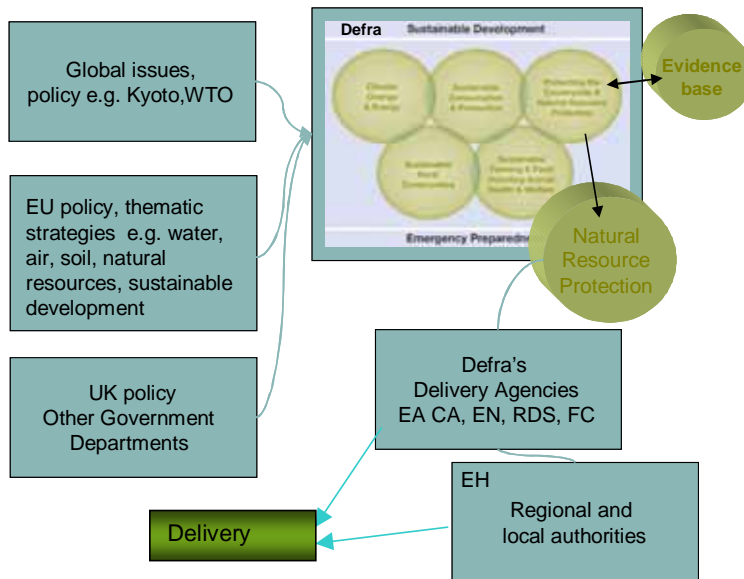
Figure 4. Different influences on natural environment policy and Defra

- Although we advocate the need for continued R&D to build the evidence base required for policymaking, this must not be used as an excuse not to make policy or to be slow in making policy – there is a risk that slow policy making may result in infraction proceedings from the EC or the risk of continued negative impact on the natural environment. As ENDS (2006)[37] eloquently point out "the hazards of over-analysis are all too visibly in the recently launched EU thematic strategies on natural resource use and waste management. Instead of setting targets, the strategies propose initiatives to improve understanding";

- There is a huge dependency on regional and local authorities in the delivery of natural environment policy and Defra must be convinced that they have the right relationships with the real influencers at these levels. We believe there is scope to strengthen the relationship with national Defra and CEOs of local authorities in influencing the delivery of natural environment policy;

- It is apparent that there is a significant dependency on agricultural policy to deliver natural environment outcomes, not least biodiversity outcomes and

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[37] ENDS Report 372.

increasingly improvements in water quality especially in terms of control of diffuse pollution from farming practices. There is a risk that over dependence on agricultural policy to deliver natural environment outcomes may dilute what can be achieved;

- The various UK high-level strategies provide something to aspire to and organise environment (and economic and social) policy around. We would contend that there is still much to be done in ensuring natural environment policy is making is joined up and seeking out greater cooperation and synergies across government departments. The Defra NRP vision presents a new opportunity to strengthen and develop new synergies at both the national, regional and local levels;

- The PSA targets agreed with different government departments have created additional focus in cooperating and working together across government. In considering the next round of setting PSA's under the forthcoming Comprehensive Spending Review Defra should consider what new PSA's might be appropriate to support and encourage other government departments working with Defra in delivering the NRP vision;

- The existing policy framework is likely to deliver the Defra NRP vision outcomes but there are risks and opportunities which are clearly articulated by the recent EEA (2006)[38] report:

    o need for greater environmental integration (where the drive for economic growth results in the use of resources);

    o fiscal policy, where traditional approach taxing human resources rather than resource use has favoured increasing labour productivity over resource productivity;

    o agricultural policy, where the objectives of the CAP are extending beyond agricultural productivity to integrate environmental concerns for the sustainable use of water and soil;

    o fisheries policy, where the CFP aims to provide coherent measure of the conservation, management and exploitation of living aquatic resources, including limiting the environmental impact of fishing in ways consistent with other EU policies;

    o energy policy, where one aim is to ensure safe energy supply;

    o transport policy, where the use of land for transport infrastructure can, for example, lead to habitat fragmentation.

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[38] EEA (2006). Sustainable use and management of natural resources. ISSN 1752-9177.

3. Core strengths and weaknesses

3.1 Policy framework limits

The Defra policy framework has limits. These can be characterised in different ways. There are clearly a number of policy areas that are the responsibilities of other Departments. However, this responsibility is of different kinds in relation to Defra's vision. For example, introduction of a fiscal measure such as the proposed pesticide tax to deliver an environmental outcome is the responsibility of the Treasury. However, this would only be undertaken if identified as important by Defra. In contrast DCLG has (and will) develop policies relating to housing without a stimulus from Defra and Defra has to work to influence that policy, e.g. the Planning Policy Statements.

The relationship with the EU can also be considered as a limit to the policy framework of the Department (although some might wish to view it as within that framework). The 'environmental guarantee' in the Treaty allows the UK to adopt measures that are stricter than those adopted at EU level. While this might raise claims of 'gold plating', it should mean that the Defra framework is not constrained by the EU. However, if EU law established requirements that are seen as unnecessary by Defra then this is a limitation of Defra influence for example, agriculture was originally exempted from the UK waste legislation when it was introduced in 1990 but the Commission has insisted it is not excluded and the agricultural waste regulations will now apply from 15/05/06.

Thirdly, even when a policy is fully developed within Defra, the realisation of that policy can be undermined due to the limitations that Defra has in terms of delivering implementation. While Defra might expect its agencies (e.g. EA or EN) to deliver implementation (assuming adequate resources), much implementation is via local authorities and here Defra has not always been able to ensure that its policies are adhered to (as seen with waste policy). The reasons for this can be due to resources, experience or political acceptance.

Finally, Defra relies on support from many others in its policy framework. This includes scientists, economists and other specialists necessary to provide the knowledge base for policy development and evaluation.

The Defra vision cannot be delivered through Defra alone. There is, therefore, a major requirement for effective partnerships and communication. There are many mechanisms for this. The vision should provide a firm foundation for targeting interaction with other Departments. It is critically important that it is used as a mechanism for integrating environmental objectives into other policy areas. More problematic is the implementation deficit and this is considered further below where local government is discussed in more detail.

3.2 How holistic is Defra's policy framework?

The policy framework for natural resource protection is complex, broad ranging and usually requires integrated holistic approaches for successful implementation and outcomes. Where Defra is the main policy owner and has a historical record of developing the policy a more holistic, joined up approach can be demonstrated e.g. with regard to agriculture and food production where the approach has evolved over the last 20 years to address pollution and habitat management. Diffuse pollution and

nature conservation in non-ESA (Environment Sensitive Area) areas are acknowledged as weaknesses in the existing framework but the Water Framework Directive and Environmental Stewardship are respectively intended to address these deficiencies.

In the area of transport and energy policy Defra cannot currently demonstrate a joined up approach either within the department or with other Government departments who have the lead policy responsibility e.g. air quality and transport impacts on biodiversity, wind farms with acid rain power stations

The Department for Culture, Media and Sport drives policies associated with tourism, leisure and amenity and the Regional Development Agencies have local responsibility. However, Defra actively promotes some rural aspects of tourism, leisure and amenity as part of its policy targets for social inclusion and increasing rural diversification e.g. farm diversification grants and the Countryside Rights of Way Act (CROW). Increased access and use of rural areas can then lead to conflicts for natural resource protection, e.g. footpath erosion, damage to SSSIs, challenges to biodiversity.

Policies on climate change certainly attempt to be holistic in their approach – and have integrated assessments of impacts and Research and Development programmes – there are some discussions about interactions e.g. sea level rise and biodiversity but little information is available in some areas such as impact on greenhouse gas emissions. However, uncertainty of the outcomes makes dovetailing of policies difficult. Focus is largely on impacts and further work is needed on adaptation.

Defra has a more holistic approach to waste management which will include agriculture from May 2006. The Environment Agency is a key driver for implementing commercial and industrial waste policy and local authorities have responsibilities for disposal and recycling. However the Defra family is not in control of all waste issues, for example e.g. the Department of Trade and Industry has responsibility for policies such as the Environmental Liability Directive and disposal issues concerning items such as cars and fridges. Example of crosscutting policy e.g. agricultural waste can cause environmental pollution through diffuse emissions to soil, water and air.

3.3 Being proactive

Defra has a good track record in developing strategic innovation and for driving policy changes at the Global, EU and national levels. Examples include climate change policy where UK Government has been very proactive adopting targets ahead of those agreed at Kyoto and emissions trading mitigation targets ahead of those agreed by the EU and international community. Other examples include the 2005 proposals to further reform the CAP, the initiation and development of the WFD and the overall policy responsibility across government for Sustainable Development. Defra has been insufficiently proactive in some policy areas e.g. waste policy – where local authorities have not been driven to develop their waste strategies and in some cases still do not have plans in place.

The transparency of the full extent of Defra's approach and activities is not always apparent. External factors such as the EU, international negotiation, balancing the needs of other government departments and the resource allocation from the HM Treasury must sometimes challenge and constrain the aspirations of Defra's vision for natural resource protection. For example, both the EU and the HM Treasury limit CAP Pillar 2 payments so the availability of agri-environment scheme grants for

biodiversity and resource protection targets is restricted. It may pay Defra to clearly articulate the many factors outside of its control that may hinder the Department from fully realising policies it is responsible for. Defra has devolved some powers to its implementation agencies and Defra needs to be more proactive on ensuring enforcement of the implementation of its policies. For example, there are relatively few English Nature prosecutions concerning damage to SSSI's and yet targets for their improvement are behind schedule, even when the English Nature advisory approach is used to encourage better management practices. To date, there has been overlap and unclear boundaries concerning the role of Defra and its agencies concerning the management and governance of diffuse pollution. Good working practices and proactive action is seen in the relationship between Defra and the Environment Agency in the flood policy area where responsibilities are clearly defined and proactive responses to managed realignment of coastal areas has been agreed.

3.4   How adaptive or flexible is the framework

The policy framework on Natural Resource Protection has evolved from an amalgam of policies inherited from the previous departments that formed Defra. One consequence of this has been the degree to which policy formulation has developed largely in relatively discrete silos, which in turn has meant that framework has strength of focus and power in implementation but a degree of inflexibility in the way it has been formed and developed. As an example we can cite the potential impact of the Nitrates Directive on the probability of meeting the ammonia emission target under the national National Emission Ceilings Directive (NECD). Reducing nitrate leaching has no direct effect on ammonia emissions, although the implementation of closed periods on all soil types for slurry spreading will significantly increase ammonia emissions as a result of increased slurry spreading in spring and summer[39]. However, one of the most cost-effective means of reducing ammonia losses is to band apply or rapidly incorporate slurries and manures applied to tillage land. For incorporation following surface application, manures/slurries need to be applied before the crop is sown. The majority of UK arable crops are autumn-sown and regulations to reduce nitrate leaching prohibit the application of slurry and poultry manures in late summer and early autumn. Thus they will have to be applied to growing crops in the spring and depending upon soil conditions at the time of application, slurry banding or top dressing of manures are likely to be less effective in terms of this potential avenue for ammonia abatement is closed than rapid incorporation. This is a good example of a negative impact of one policy on another form of pollution. However, reducing nitrate leaching has been identified as one of the most cost-effective means of reducing indirect nitrous oxide emissions from agriculture. A good example of synergy – where policy aimed at one objective (reduced nitrate leaching) contributes towards other objectives, in this case a reduction in emission of the very potent greenhouse gas, nitrous oxide. A reduction in the level of soil and water nitrate reduces the subsequent risk of denitrification and, hence, nitrous oxide emissions.

The past environment of discrete and focused policy objectives is being replaced by one that is much more complex with multiple interrelated objectives, which in the case of natural resource protection is based on an ecosystem approach. The dimensions created by this approach require a flexibility not available through the current framework. This is apparent at the local level where often natural resources are compromised at the expense of economic development and the true cost of the loss of associated ecosystems services or their associated environmental limits are either

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[39] The reduction of total nitrogen use e.g. through better application of fertiliser recommendations, or and in particular, taking full account of manure use is a very effective way of can reducing nitrate leaching, though not& ammonia emissions**.**

not fully understood, or explained to society. Going forward, the way policies are joined up and how they are implemented in a local spatial context needs to become much more important. This will mean that how they are applied will vary from area to area depending on the specific issues faced in those areas.

To develop and implement policy in this way will require a change of approach in the way that policy is developed. Greater attention to how different policies, both Defra owned policies and those of Other Government Departments, may inter-act with ecosystem services and those polices seeking to protect and enhance the natural environment need to be considered more earnestly and in much more depth. The local framework in which policies are applied will need to be considered and developed with local stakeholders.

Defra's record in the use of the RIA is recognised as exemplary e.g. Defra's Partial Regulatory Impact Assessment: Groundwater Proposals under Article 17 of the Water Framework Directive is very comprehensive. The RIA concludes that the existing framework of primary legislation, outlined in Section 2.3, provides many of the powers needed to implement the WFD. These measures include the Environmental Protection Act 1990, the Water Resources Act 1991, the Water Industry Act 1991, the Environment Act 1995 and the Pollution Prevention and Control Act 1999 in England and Wales, together with their equivalents in Scotland and Northern Ireland. Some additional regulations will be required to ensure full implementation of the WFD, most notably in the area of diffuse pollution. The extent to which they would be used in the future would be decided in the river basin management plans, in the light of the other measures available to address diffuse pollution problems and achieve the required water status most cost effectively.

However this process currently does not go far enough for the direction now having to be developed. Whilst it does require analysis of the impact on a broad range of issues it still largely supports the development of policy in silos requiring that the impact is assessed but not taking forward in accordance with the ecosystem approach now required. Since the focus of the RIA is groundwater there is no reference to impacts on the implementation and compliance with of other legislation such the Habitats and Bird Directives.

To move forward not only will the processes have to change but also a change in mind-set and culture will be required. As Defra develops its crosscutting strategic policy approach it will recognise how natural resource protection can be inextricably linked to activities which may not have previously been considered for example, soil functions may be enhanced or damaged by the policies which determine the disposal options for organic and non-organic waste materials from domestic and industrial wastes. Defra will also need to enable policy to evolve as the scientific evidence base changes, for example, where science is often uncertain about an effect the precautionary approach is adopted. The $0.1\mu g\ L^{-1}$ Maximum Admissible Concentration (MAC) for a single pesticide in water was agreed on the basis of the precautionary principle yet considerable evidence is available to indicate that scientifically derived, toxicity based standards could replace the current MAC. Is the knowledge base adequate?

The science and evidence base[40] appears to be well founded for many aspects of resource protection although some areas are considered to need greater understanding – for example Climate Change and marine ecosystems. Of increasing importance will be reinterpretation of much of the single issue information in order to

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[40]Defra (2004) Evidence and Innovation Strategy 2005-2008, Consultation Document, London

understand the interaction of ecosystems and the economic and social dimensions which will be affected by CAP reform and other major policy changes such as the Water Framework Directive.

However we are faced with addressing resource protection with insufficient time to generate required knowledge, again the WFD is case in point where catchment sensitive farming programmes have to be put in place without full knowledge of the social, environmental and economic interactions. In such instances models to predict outcomes are essential, and need to be designed in way that they can be flexed as the knowledge base grows.

One specific area where the need for knowledge is evident but which is hard to predict is how protected areas, such as SSSIs will change and adapt to climate change, do we know how to protect the species so protected or should we have in place monitoring processes to identify new species that may be threatened by the changes. Defra's Evidence and Innovation Strategy is a sound basis on which to identify what needs to be done.

3.5 Participation

Participation of relevant stakeholders in the policy framework is necessary, as it not only results in better policy formulation, it also results in better implementation. While Defra has interaction 'across the board' in policy terms with a selection of stakeholders (e.g. Local Authorities), its interaction with many of those directly affected by individual policies is less even, although this is enhanced by members of the Defra 'family'.

Compared to many Departments, Defra has a relatively good reputation for openness and participation. It has adopted wider policies and practices on participation (including exploring different participatory mechanisms, such as citizen's juries on air quality issues). Having said this, policy and practice do not always meet and there are individuals in Defra who remain suspicious of the activities of some stakeholders and are not as open as they should be.

Where Defra is in direct interaction with stakeholders it has a number of participatory practices. For Defra directly, this is most evident in the agriculture sector. In this case, not only are policies controlling farmers' activities (a regulatory stick), but payments stimulate behaviour (a regulatory carrot).

Far more problematic for the policy framework are cases where Defra has no direct interaction with affected stakeholders. A good example is waste policy. If the Defra policy requirement (from EU) to reduce biodegradable waste going to landfill results in a need for waste incineration, this is only determined at local authority level and it is here that stakeholder interaction takes place (with controversial debates). As Defra sets out its policy, it is unable to say who will be affected by incinerators, so it cannot engage with local communities. The same applies (or will apply) with many other areas (e.g. measures to deliver air quality targets or measures to deliver good ecological status within a river basin management plan). Affected stakeholders can only be determined once the policy has left the doors of Defra.

The participatory context is even more difficult. where Defra is working with EU institutions to develop policy, the implications for stakeholders in the UK can be even more opaque than at UK level. This is because most attempts at stakeholder involvement (generally very limited) revolve around the development of a Commission proposal, yet a final Directive is often significantly altered by the political interests of

the Member States and European Parliament and often results as a result of compromise agreements on unrelated issues.

In conclusion, Defra cannot achieve full participation of affected stakeholders in policy development. It can develop more effective techniques for identifying key stakeholders and assessing stakeholder opinion. However, it clearly needs a more coherent policy on participation stating what can and cannot be achieved and how. The consequence for the policy framework is that some policies will develop with incomplete participation of stakeholders.

In future there needs to be a consideration of how local policies and implementation can be reviewed by stakeholders, the WFD offers and excellent opportunity to develop this approach and lessons learnt should be applied to other areas of Defra activity. There is potential to involve all local organisations and authorities to develop an integrated planning approach that balances needs and impacts through the River Basin Management Plans. Stakeholder engagement should consider:

- potential financial incentives e.g. capital grant schemes to be offered to land managers for Catchment Sensitive Farming in 2007

- legislative penalties e.g. non compliance with SSSI requirements

- effectiveness and support of voluntary initiatives e.g. the pesticide Voluntary Initiative

- other indirect benefits to the wider stakeholder community e.g. amenity, landscape appreciation and well-being.

3.6   Other issues

There are also a number of other important issues that can be identified as arising from an assessment of the policy framework:

Environmental inequality. Environmental degradation affects socially disadvantaged populations disproportionately (and conversely poorer individuals will find themselves more often in environmentally degraded areas)[41]. Participation from such communities (with Defra and their local authority) can be lower when compared to more affluent neighbourhoods. This link is a clear sustainable development challenge. Defra has some direct interest in the link between social and environmental equity, such as in delivering rural development objectives. However, generally the policy framework is not sufficiently flexible to tackle this issue. This is because many policies are driven from an environmental perspective alone and a 'deviation' from this to deliver social outcomes could be perceived by the public as out with Defra's remit[42].

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[41] See for example SDRN briefing two Environment and Social Justice http://www.sd-research.org.uk/documents/SDRNbriefingTwo_Final.pdf and ESRC Global Environmental Research Programme (2001). Environmental injustice: rights and means to healthy environment for all. Special Briefing No. 7, University of Sussex. Both these summaries illustrate the relationship between social deprivation and poor local environment quality.
[42] The wider Defra family also such as the EA recognise the relationship between social deprivation and poor environmental quality e.g. Environmental Quality and Social Deprivation, 2003) as well as OGD's such DCLG whose PSA's 1 and 8 if achieved should also contribute to reducing environmental injustice. The DCLG publication *Living Spaces – Cleaner, Safer, Greener (*2002) recognises the importance of public space for people; the 'Cleaner Safer Greener Communities' campaign, led by DCLG and with cross-government involvement sought to improve public spaces; the report Improving the Prospects of People Living in Areas of Multiple Deprivation in England (January 2005) notes that a high quality built and natural environment underpins long-term sustainable economic growth as well as helping to attract and embed investment, attract entrepreneurs and talent, and contributes to the development and regeneration of communities.

Led by DCLG[43] national policy such as the National Strategy Action Plan, Neighbourhood Renewal Fund (working with Local Strategic Partnerships, LSPs) and the requirement of local authorities to produce Community Strategies[44], provide a range of opportunities for local authorities to address environment injustice. Whilst there is reportedly a good working relationship between Defra[45] and the NRU (Neighbourhood Renewal Unit) (e.g. Neighbourhood Wardens and neighbourhood management; air quality; rural proofing) concern has been expressed that the environment is relatively marginalised in government[46]. Defra has a role to play here in raising the profile of the environment within government (which is also relevant to its PSA 1) and concerted action with other OGD's to sell the wider benefits of environmental initiatives in terms of their ability to deliver other policy objectives such as health, employment and crime reduction. Furthermore, concern has been expressed about opportunities for local partnership working and even that LSP's whilst having the potential to deliver environmental improvements are not necessarily appropriately organised to do so – again there is potential here for stronger engagement from Defra both at the strategic level / senior level and local level to foster stronger relationships and leadership (see Box 7). Arguably, much of Defra's remit is concerned with social interactions with the environment e.g. access to countryside, and many ecosystem services are economic / social e.g. clean air / water for health objectives.

Box 7 – environmental justice toolkit

The US Environment Protection Agency (EPA) recognises the impact of a poor environment on human health also seeks to empower all communities through education and information dissemination to have a better understanding of the environment and its impact on health. More specifically the EPA recognise "environmental justice is the goal to be for all communities so that: (1) people of *all* races, colours, and income levels are treated fairly with respect to the development and enforcement of protective environmental laws, regulations, and policies; and (2) potentially affected community residents are meaningfully involved in the decisions that will affect their environment and/or their health".

The EPA have developed a toolkit that provides a conceptual framework for understanding environmental injustice as both civil rights and as environmental policy; the toolkit also provides a means of responding to a potential environmental injustice and is a tool available to EPA staff who all have the responsibility of to seek ways to integrate environmental injustice considerations into EPA programs, policies and activities. The EPA as a means of mainstreaming environmental injustice considerations into daily activities and help identify and address environmental justice concerns run a workshop for staff "Fundamentals of Environmental injustice" covering perceptions and definitions of environmental injustice, environmental laws and their implementing regulations, GIS and other analytical tools.

Interestingly , in the ESRC (2001) report on environment justice one of the recommendations is that policy-makers need to bear social justice dimensions in mind during the design of environmental policies, and environmental factors in the development of social policy.

Source: http://www.epa.gov/compliance/resources/policies/ej/ej-toolkit.pdf

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The recently published Environment Agency Fisheries Strategy[47] is a good example of the integration of environmental, social and economic objectives as it recognises that anglers spend £3 billion on their sport each year. The EA states that benefits also include:

- Surveys show that angling gives the greatest boost to self-esteem and well-being

- Angling is a proven and cost-effective way of tackling anti-social behaviour, educational under-achievement and youth-crime

- Seeing fish is one of the best indicators of a clean water environment.

- Angling creates jobs and prosperity, extending visitor seasons, and providing good business for restaurants, pubs, shops, hotels, angling clubs and other businesses.

Subsidies and taxes. Defra can subsidise some activities (both beneficial and damaging to the environment). Treasury can impose taxes on harmful behaviour. Defra has been an important promoter of the latter, such as on differential fuel taxation or the landfill tax, with good results. However, there are clearly limitations (as seen with the fuel 'escalator', which was halted due to public backlash). Defra recognises the problems derived from environmentally damaging subsidies (such as under Pillar 1 of the CAP), however while largely dependent upon wider CAP policy, Defra could improve its policy delivery in this area.

The planning process. Local planning is primarily the responsibility of DCLG, although many Defra policies are effectively delivered (or undermined) through this mechanism. Where problems arise they often reflect a failure of joined-up government (nationally and/or locally) as can be seen with conflicts over housing objectives with those for water, transport and waste management. A similar case could be made for some port developments. Decisions can be made directly opposed to Defra's vision. While this is not a failure of a specific Defra policy in itself, it could be argued that it is a failure of the framework to adequately address the environmental aspects of competing policy outside of the Department. Such mechanisms of interaction must also be part of the policy framework.

Policy proofing. Policy proofing is an interesting process within the policy development framework. A good example of this is rural proofing whereby policies are assessed for their wider impacts on rural objectives. This enhances the integration of policy development, reducing conflict and confusion among stakeholders. There are other examples of similar types of approach. The Cabinet Office guidelines on RIA could be viewed in this light (e.g. in assessing impacts on business) as might future requirements on assessing regulatory burdens. However, it remains unclear how far policy development (and one could include Defra's own analysis of EU proposals) is 'proofed' against critical strategic Government policies, such as on sustainable development.

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[47] Environment Agency (2006) A better environment, healthier fisheries, Better Fisheries for our Nations, our strategy for 2006-2011. www.environment-agency.gov.uk/commondata/acrobat/strat_1344107.pdf

4. Improving the framework and its outcomes

4.1 Policy framework

The policy framework impacting on the natural environment is difficult to define and conceptualise in its entirety as it is not confined to those policies that are directly concerned with resource protection. Defra's challenge is to ensure that its own policy framework and deliverables are not compromised by other policy initiatives. In consequence Defra needs to proactively interact with the European Commission, international and national government departments, within Defra itself and with other key influencers/stakeholders to ensure successful outcomes.

Overarching frameworks that place the natural environment protection policy framework in overall context of national and global policy for economic and social issues and the environment exist. At the EU level the this overarching framework for environmental policy is provided by the Sixth Environment Action Programme (6th EAP) and the development of seven associated thematic strategies on air, waste, marine, soil, pesticides, natural resources and the urban environment.

Such thematic strategies provide a longer-term perspective for clear environment objectives to be developed, providing a foundation for the next generation of EU environment policy. They build on previous and existing approaches (Chapter 2.0) which have addressed inputs (e.g. Nitrate), resource management (e.g. Water Framework Directive) and specific uses of the environment (e.g. Habitats Directive). The thematic strategies are also an important contribution to Better Regulation as they simplify and clarify existing legislation and propose proportionate legislation where new laws are deemed necessary. It is intended that policy instruments will be adapted or developed to deliver European policy goals and targets in the least onerous and most cost effective way possible. Natural resource framework directives (water, air, soil) have or are being developed /proposed to integrate disparate legislation and provide a clearer outcomes focus for delivery agencies.

Within the UK the sustainable development strategy can be seen as the overarching holistic framework for the government policy. Defra is the lead Department, and chairs a Programme Board to oversee delivery of the strategy, but all UK Departments share responsibility for making sustainable development a reality. Securing the future (2005)[48] - the UK sustainable development strategy sets out the Government's strategy for sustainable development, taking into account the national and international developments that have occurred since its previous policy statement[49] including devolution in Scotland and Wales and the 2002 World Summit on Sustainable Development. The strategy is based on four agreed priorities of sustainable consumption and production, climate change, natural resource protection, and sustainable communities with a focus on tackling environmental inequalities. Proposals include: the establishment of a new Community Action 2020 programme; and strengthening the role of the Sustainable Development Commission to ensure an independent review of government progress, with all central government departments

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[48] The UK Government sustainable development strategy - Securing the future, 2005, HM Government

[49] A better quality of life: a strategy for sustainable development in the United Kingdom, 1999, HM Government

and executive agencies to produce sustainable development actions plans by December 2005.

Whilst an infrastructure for a framework is in place, the details such as responsibilities, policy instruments, priorities, interactions, conflicts etc are not always described or understood and greater clarity is required to provide a clearer picture of the operational and delivery framework. Our analysis demonstrates that there are conflicts and synergies between policies and there are many activities which pose a threat either directly or indirectly and for which Defra has no formal responsibility or jurisdiction. Whilst specific issues are addressed to varying degrees the framework has room for improvement in a number of areas including:

- Policy development

- Policy ownership

- Policy delivery and accountability

- Policy evaluation

- Delivering the vision

- Education and public awareness

4.2   Policy development

Defra has, in a number of cases, been proactive in the development of EU policy (e.g. Water Framework Directive) but there needs to be an increased interaction between UK departments so that EU discussions and lobbying lead to policy development which is better informed of crosscutting issues which historically may not have been fully considered e.g. tourism impacts on biodiversity. Whilst sustainable development, thematic strategies and framework directives all provide future promise of more holistic approaches there is still an issue that existing policies are not integrated and many parts will not deliver the sum in the shorter term.

Defra's consultation on the Evidence and Innovation Strategy[50] recognises that policy must be developed from a research and science evidence base. The evidence-based policy model provides an ideal operational model for developing and evaluating the success of existing policies and their delivery. There needs however to be a greater recognition of the interaction of the different strategic and policy outcomes and their integration with sectoral policies. This process is iterative and will lead to better understanding of the evidence base and thus improved policy. The approach sets a framework for collating the vast array of evidence developed by a multitude of stakeholders.

A more comprehensive review of the threats to determine the resulting priorities should be undertaken. Climate change will have massive implications for natural resource protection so for example, should a protected habitat be actively managed to attempt to negate the impact of climate change or should management policies be focussed to enable protected species to survive elsewhere? Expert judgement of the evidence base, media attention and the influence of key stakeholders largely drive current priorities. A transparent prioritisation process needs to be agreed.

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[50] Evidence and Innovation Strategy 2005-2008, Consultation Document, 2005, Defra,

We believe Defra should challenge its existing structure to see how flexible it is to deliver integrated policies. For example, why does Catchment Sensitive Farming sit in a different Directorate General to Sustainable Food and Farming and why are water and air part of the Environment Directorate General when they are clearly two of the key natural resources? Groups like the Nutrient Management Unit do provide integration of issues for some cross-cutting topics and provide a good example of working practice between different Directorates and Divisions, thus avoiding the 'silo' approach. Defra should consider establishing more cross-cutting, temporary if appropriate, response groups to ensure flexibility and integration of policy e.g a cross-cutting ecosystem services group. An alternative, radical option would be to consider an establishing ecosystem function division as defined by DeGroot et al (2002)[51] that included the following functional areas:

Regulation functions:	providing maintenance of essential ecological processes and life support systems
Habitat functions	providing suitable living space for "wild" plant and animal species
Production functions	providing natural resources from which to make goods (consumable and structural);
Information functions	providing opportunities for cognitive development

Recent developments to better integrate economic assessments into Defra environmental policy are seen as further examples considering some of the wide issues of policy making although we are not sure to what extent valuations of ecosystems services are considered in these economic assessments. The assignment of science co-ordinators to each Defra policy division demonstrates the commitment to scientifically based policy making; in the same way the assignment of social scientists and economists to policy divisions would help in the mainstreaming of an ecosystem based approach to policy making.

4.3   Policy ownership

Whilst Defra has overall responsibility for Sustainable Development it relies heavily on other Government Departments taking up the challenge to ensure its departmental policies are fully integrated with those of others. As part of the strengthening of the Sustainable Development Strategy, each key Government department has identified some of their high level contributions to delivering this strategy (see www.sustainable-development.gov.uk/delivery/key-contribution/index.htm). All of the following departments should have produced a Sustainable Development Action Plan by the end of 2005:

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[51] de Groot, R.S., Wilson, M., and Boumans, R.M.J. (2002) A typology for the classification, description and valuation of ecosystem functions, goods and services. Ecological Economics. 41, 393-408

- Department for Communities and Local Government

- Department for Work and Pensions

- Department for Transport

- Department for Culture, Media and Sport

- Foreign and Commonwealth Office

- Department for Environment, Food and Rural Affairs

- HM Treasury

- Department for Education and Skills

- Department of Health

- Department for International Development

- Home Office

- Ministry of Defence

- Department of Trade and Industry

We have identified examples of direct policy conflict for natural resource protection (see Chapter 3 e.g. housing, transport, energy) where it is clear that there needs to be an introduction of /or improvements to a formal mechanism for interchange of views which is not bureaucratic, costly or time consuming. Could divisions be assigned responsibilities for departmental liaison on key threats e.g. Sustainable Land Use Division has a planning policy liaison with DCLG. It is clear that the implementation and join up of the policy framework does need to have pace to address urgent issues and identify issues on the horizon.

The Strategic Policy Unit (SPU) of the Welsh Assembly Government has been working in partnership with the Forum for the Future developing an integration tool for testing the Assembly's policies against its strategic agenda. The work on the tool was initially taken forward through a series of seminars and workshops with over 300 staff. These results then fed into the final development of the tool. The Cabinet and management board of the Welsh Assembly Government has since approved it. The tool forms the basis of the Assembly's "*Policy Gateway process*" which is a system of tools and guidance aimed at improving the policy-making process, this includes a commitment to routinely meet with policy makers to understand the impact of each others proposals and activities. The Strategic Policy Unit is currently designing a series of training events and developing guidance for staff on how to use the tool and analyse the results. This is process is similar to that being currently being developed by Defra's Sustainable Food, Farming and Fisheries Directorate with ADAS.   These approaches and tools should be considered and their suitability assessed for implementation across relevant Defra departments.

We believe there is an opportunity for Defra to proactively challenge the fundamental basis of some of the interacting and conflicting policy areas, for example, housing development policy and associated social issues are not Defra's responsibility but they do directly influence Defra's achievement of its natural environment vision. Why should there be a development focus on the South East where water resources are limited, can further incentives be given for urban regeneration and brownfield site development, do people need to own their houses? Housing models in the some countries of the EU encourage cohabitation and flexible, interchangeable, housing provision for different family groups and ages. Could UK policy be changed to encourage higher cohabitation through tax/fiscal measures to reduce the overall increase and resulting pressures? Global policy and fundamental economic theory

may also need to be challenged, e.g. the local food policy will not change dramatically until global policy is changed. Fiscal instruments are now being considered to reduce vehicle access areas within the Peak District National Park, following the model of the London congestion charging scheme. Plans are to gate the route round Ladybower Reservoir and to offer visitors the choice of reaching the lake by shuttle bus or paying to drive there.

Unfortunately political constraints do operate and desired outcomes cannot be necessarily achieved, for example, UK Government's 2005 proposals to further reform the CAP or Fisheries policy. Political realities mean that compromises need to be agreed until changes can be implemented. A full understanding of the major threats and priorities will assist negotiation. If 80% of the targets can be achieved the remaining 20% needs to be managed to minimise undesirable impacts. Improvements in the communication process e.g, vertical and horizontal dialogue with other government departments and local authorities, transparency, balance of flexibility and timeliness are all required. There needs to be agreed, accountable and transparent methodologies to achieve balanced outcomes. Relevant departments need to assess proposals with respect to delivering the vision - producing clear statements on compromise areas. Defra's responses to other government departments on their policy proposals should be placed in the public domain.

4.4   Policy delivery and accountability

Defra relies on its agencies, notably the Environment Agency, Countryside Agency, Rural Development Service and English Nature for the delivery and enforcement of its natural environment policies. The range of organisations and their responsibilities is complex and, from the outside, appears confusing, although the establishment of Natural England should reduce this apparent complexity. The new integrated agency will comprise all of English Nature (EN), the landscape, access and recreation elements of the Countryside Agency (CA), and the environmental land management functions of the Rural Development Service (RDS). A single, independent, statutory organisation championing integrated resource management, nature conservation, biodiversity, landscape, access and recreation is a significant step forward, building on the capability of the existing organisations.

The Hampton review [52] recognised that there are currently overlaps in agency responsibilities and enforcement, that there are uncoordinated approaches and good practice is not uniform. The challenge will be to ensure that there are clear remits for each agency with respect to the protection of the natural environment and that vision statements and policy implementation fully reflect Defra's requirements. Delivery of policies concerning diffuse pollution from urban areas and agriculture provide an example whereby a number of agencies and local authorities are involved in implementing Defra policy, arguably with overlapping approaches and conflicting (advice and regulatory) agendas.

There is a danger that as policy responsibilities are delegated from the centre that the environmental focus, prioritisation and control are lost, often in favour of socio-economic priorities. This is particularly apparent when regional and local governments implement the policy e.g. some local authorities have no waste strategies – an example of lack of accountability between National Government and the local authorities. Whilst Defra does communicate directly, in some cases, with regional and

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[52] Hampton P., (2005) Reducing administrative burdens –effective inspection and enforcement. HM Treasury

local authorities, reliance is placed on its agencies for local delivery and there needs to be more direct engagement between Defra in Whitehall and the regions rather than reliance on Government Office and regional Defra agencies. Yet it can be the local government authority which has the most pivotal role e.g. planning, transport, tourism etc. We see that there is a clear need for Defra to develop a more coherent and joined up communication with Local Government to optimise opportunities to protect the natural environment. The approach must consider how local activities, local organisations governmental and non-governmental, landowners and the private sector can work with Defra and should include an analysis of the complex funding streams and multiple ownership of issues e.g. funding and management of RAMSAR sites to protect and enhance wetlands. Our discussions with EMRA (East Midlands Regional Assembly) indicated that Regional Assemblies would benefit from regular briefing and discussion on policy implementation with Defra with regard to natural resource protection.

The implementation of the Water Framework Directive provides an ideal opportunity to develop coherent and co-ordinated approaches to water quality and quantity protection and the localised initiatives could serve as a framework for integrating other policy requirements such as biodiversity targets. Similar initiatives can be seen in other countries where integrated catchment management (ICM) based initiatives to reduce urban and agricultural diffuse pollution are driven by local people e.g. communities residing within the Murray-Darling Basin in Australia have committed themselves to the ecologically sustainable management of resources through an ICM framework.

It is not clear what mechanisms operate to ensure the accountability of Government Departments including Defra, Defra agencies and Local Authorities in implementing natural environment policies. The processes by which priorities are identified and then agreed need to be clearly understood before improvement measures can be made.

4.5 Policy Evaluation

An ecosystem management approach enables an integrated process by looking at the entirety of a natural system, rather than the individual elements that make it up. Comprehensive systems such as target levels or indicators are available to assist in the evaluation of the success of policies e.g. air quality indicators consider levels of SO_2, PM10, NO_2, CO, Pb, benzene, 1,3-butadiene, O_3 and PAHs. The indicators are primarily concerned with human health and the trends they exhibit may be difficult to interpret especially when considering their relevance to the functioning of ecosystems and the long-term health of the system and the services it performs for human benefit. The Nitrates Directive has a limit of 50mg L^{-1} for nitrates in surface and groundwaters but attainment of this standard does not necessarily mean that the Vision requirement of 'clean water' is achieved and consequently more explicit definitions are required for the Vision. Further work is needed to understand and develop analytical tools to identify whether individual policies are working and whether the combined impact of a range of policies impacts on the functioning of an ecosystem. If the ecosystem management approach is to be adopted further, research will be required to define objectives and targets e.g. the 'good ecological status' for surface water bodies has yet to be defined and agreed within the Water Framework Directive.

Evaluation also needs to identify how joined up the different initiatives and approaches are, for example, regarding biodiversity and food production, there are now a number of protected areas, agri-environment schemes or general advice initiatives – are they seeking to achieve common goals? Defra recognised this need when addressing the various different requirements for soil management planning

under Cross Compliance, Entry Level Scheme and for more detailed soil management issues. A framework for soil management was established which ensures minimum duplication and conflict between schemes. Policy instrument tools do vary for example, the EU Habitats Directive provides more stringent legislation compared to the requirements for land managers to comply with the protection of Sites of Special Scientific Interest (few prosecutions are carried out even when sites are purposely or accidentally damaged). Do we know if the more stringent legislation achieves more results rather than from guidance or softer, less enforced legislation?

Changes in subsidies and policy instruments will threaten future farming practices and possibly some of the associated biodiversity. Engaging land managers requires the right incentives rather than over regulation or a plethora of schemes.

4.6 Policy Proofing

Currently a Regulatory Impact Assessment is needed for any form of regulation – for example formal legislation, codes of practice or information campaigns etc and is required to consider the full range of potential economic, social and environmental impacts - and where the impact may fall; within business, the public sector, the voluntary sector or other groups. It appears not however to have a structured approach to considering the environmental impacts in relation to resource protection.

Strategic Environmental Assessments are an approach that may be relevant to adopt more widely than the programmes and plans for which they are required at present. An alternative approach would be to adopt a similar scheme to the Rural Proofing process and checklist that departments are required to apply to both the design and delivery stages of all policies, programmes and initiatives and which then inputs into the RIA. It has a reporting requirement. Government Departments and Government Offices for the Regions are required to report annually on how their policies have been rural proofed.

Rural Proofing

Rural proofing is a commitment by the Government to ensure that all its domestic policies take account of rural circumstances and needs (Rural White Paper, 20001). It is a mandatory part of the policy making process, which means that, as policies are developed, policy makers should systematically:

- consider whether their policy is likely to have a different impact in rural areas, because of particular rural circumstances or needs;

- make a proper assessment of those impacts, if they are likely to be significant;

- adjust the policy, where appropriate, with solutions to meet rural needs and circumstances.

The Questions it covers are:

1. Will the policy affect the availability of public and private services?

2. Is the policy to be delivered through existing service outlets, such as schools, banks and GP surgeries?

3. Will the cost of delivery be higher in rural areas where clients are more widely dispersed or economies of scale are harder to achieve?

4. Will the policy affect travel needs or the ease and cost of travel?

5. Does the policy rely on communicating information to clients?

6. Is the policy to be delivered by the private sector or through a public-private partnership?

7. Does the policy rely on infrastructure (eg. broadband ICT, main roads, utilities) for delivery?

8. Will the policy impact on rural businesses, including the self-employed?

9. Will the policy have a particular impact on land-based industries and, therefore, on rural economies and environments?

10. Will the policy affect those on low wages or in part-time or seasonal employment?

11. Is the policy to be targeted at the disadvantaged?

12. Will the policy rely on local institutions for delivery?

13. Does the policy depend on new buildings or development sites?

14. Is the policy likely to impact on the quality and character of the natural and built rural landscape?

15. Will the policy impact on people wishing to reach and use the countryside as a place for recreation and enjoyment?

4.7 Education and public awareness

In a number of countries there is a greater public awareness of environmental issues and the need to protect natural resources. In Nordic countries, for example, there is a greater degree of local ownership and stricter implementation of legislation, particularly at the local level. Defra should investigate the drivers behind this different public attitude to the environment to see whether any lessons can be learnt to improve engagement with the public and other stakeholders such as industry and regional authorities

Whilst public consultation is a normal process for Defra it appears that there is no Defra policy on stakeholder engagements. Whilst we strongly support the need to work closely with key stakeholders it should be recognised that some have conflicting agenda, are strong on public relations and promotion of their views but may not represent the silent majority. There is a need for robust processes to achieve a satisfactory balance of views e.g. stakeholder mapping. The process needs to be seen to be of benefit and that stakeholders can contribute effectively to the policy outcomes. Where cost sharing is a driver, it is important that the costs of implementation are shared equably to include all beneficiaries, for example, most landowners feel that they disproportionately bear the cost and risks associated with The CROW Act, but the beneficiaries' contribution through taxation is very modest.

4.8 An Alternative Policy Framework - An Ecosystem Services Approach

The vision objectives behind the natural resource protection seem to be based on previous Government programmes and policies i.e. they focus on air, water, soils, forests etc rather than taking a radical look at what is required to protect the natural environment. An alternative approach is to consider developing policy in the context of an ecosystems approach whereby healthy functioning of the constituent parts of the natural environment (soil, water and air) will lead to the environmental functions and services we expect the natural environment to enhance human well-being[53].

The Millennium Ecosystem Assessment (MA)[54] was called for by United Nations Secretary-General in 2000 to assess the consequences of ecosystem change for human well-being and the scientific basis for actions needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being. Different combinations of services are provided to human populations from the various types of ecosystems. Their ability to deliver the services depends on complex biological, chemical, and physical interactions, which are in turn affected by human activities.

Key messages from the MA report include:

- Everyone in the world depends on nature and ecosystem services to provide the conditions for a decent, healthy, and secure life.

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[53] J.W. Boyd and H. Banzhaf, (2005) Ecosystem Services and Government Accountability: The Need for a New Way of Judging Nature's Value. Resources, Summer 16-19.

[54] Millennium Ecosystem Assessment (2005), Living Beyond our Means – Natural Assets and Human Well-being, Statement from the Board. http://www.millenniumassessment.org/en/index.aspx

- Humans have made unprecedented changes to ecosystems in recent decades to meet growing demands for food, fresh water, fibre, and energy.

- These changes have helped to improve the lives of billions, but at the same time they weakened nature's ability to deliver other key services such as purification of air and water, protection from disasters, and the provision of medicines.

- Measures to conserve natural resources are more likely to succeed if local communities are given ownership of them, share the benefits, and are involved in decisions.

- Even today's technology and knowledge can reduce considerably the human impact on ecosystems. They are unlikely to be deployed fully, however, until ecosystem services cease to be perceived as free and limitless, and their full value is taken into account.

- Better protection of natural assets will require co-ordinated efforts across all sections of governments, businesses, and international institutions. The productivity of ecosystems depends on policy choices on investment, trade, subsidy, taxation, and regulation, among others.

The MA report makes specific recommendations to improve policy, planning, and management.

■ Integrate decision-making between different departments and sectors, as well as international institutions, to ensure that policies are focused on protection of ecosystems.

■ Include sound management of ecosystem services in all regional planning decisions and in the poverty reduction strategies being prepared by many developing countries.

■ Empower marginalized groups to influence decisions affecting ecosystem services and recognize in law local communities' ownership of natural resources.

■ Establish additional protected areas, particularly in marine systems, and provide greater financial and management support to those that already exist.

■ Use all relevant forms of knowledge and information about ecosystems in decision-making, including the knowledge of local and indigenous groups.

We propose that Defra should identify and prioritise the ecosystem services that should be preserved or enhanced at the regional or local level. The scope for better integration of existing policy measures should be identified. The balance with conflicting policies can then be more readily addressed, for example, if housing development for a particular area is considered essential, can the ecosystem functions and services still be maintained within the development area. Development areas and green space can be designed to ensure habitats are dynamically managed to preserve and enhance biodiversity.

The MA report states that protection of nature's services is unlikely to be a priority so long as they are perceived to be free and limitless by those using them—effective policies will be those that require natural costs to be taken into account for all economic decisions. Second, local communities are far more likely to act in ways that conserve natural resources if they have real influence in the decisions on how resources are used—and if they end up with a fairer share of the benefits. Finally, natural assets will receive far better protection if their importance is recognised in the central decision-making of governments and businesses, rather than leaving policies associated with ecosystems to relatively weak environment departments.

Annex 3 develops concepts and aspects of ecosystems approach to policy in greater detail. The main messages are as follows:

- Environmental policy has been mainly reactive to actual and more recently potential environmental risks. It has also tended to be fragmented and in some cases conflicting. The use of the DPSIR framework encourages a reactionary perspective.

- The current policy framework is not responding to the growing discourse on ecosystem functions and services and their critical contribution to social well-being

- Damage to ecosystems functions and services is strongly linked with deficiencies in institutional frameworks, particular ill-defined property rights that lead to market failure and policy failure.

- There is clear evidence of institutional inertia: the spatial planning system for example, operates under a historic regime that serves entrenched interests that for the most part cannot, and often do not wish to, place the enhancement of ecosystem services as a key development goal.

- There is a clear need for a better definition of social well-being that adequately accommodates the key role of natural capital and ecosystem services.

- There needs to be a better understanding of the relationship between human activity, ecosystems services and social well-being, and this understanding needs to inform new types of adaptive management and governance.

- There is a clear role for encouraging individual and collective actions to moderate behaviour in order to achieve more sustainable outcomes: but such examples of constrained consumption for the greater good need to be shown to work.

- Environmental policy needs to be fully integrated with policy for the major economic sectors such as industry, transport, energy, housing. Reliance on sustainability appraisals more recently applied in areas to development proposals suggests this is not currently the case.

It is clear that a paradigm shift is required to put ecosystem services at the centre of development management.   The current incremental approach provides a second best approach.

5.   Key priority actions

1. Defra needs to proactively interact with the European Commission, international and national government departments, within Defra itself and with other key influencers/stakeholders to ensure existing policies take account of the need to protect and enhance natural resources. Ideally formal or statutory processes within Defra and across government should be established rather than being left to individual policy divisions to set up. Improvements in the communication process e.g. vertical and horizontal dialogue with other government departments and local authorities, transparency, balance of flexibility and timeliness are all required.

2. The central decision-making capability of governments and businesses need to recognise that natural resources will receive far better protection if their importance is valued and is a key priority , rather than leaving policies associated with ecosystems to less influential and possibly siloed environment departments.

3. There needs to be agreed, accountable and transparent methodologies to achieve balanced outcomes.   Relevant departments need to assess proposals with respect to delivering the Vision - producing clear statements on compromise areas. Details, such as, responsibilities, policy instruments, priorities, interactions, conflicts etc. are not always described or understood and greater clarity is required to provide a clearer picture of the strategic, operational and delivery policy framework.

4. Defra should identify and prioritise the ecosystem services which should be preserved or enhanced and relate the Vision to these rather than aspiring to ' improve air and water quality and effectively manage landscapes, forests and soils'. That is, the Vision sets out very aspirational objectives without clearly relating these to actual ecosystems that need to be preserved or protected. In doing this it may then be feasible to identify which policies conflict with natural resource protection policies and then seek to redress the balance..

5. Defra's evidence-based policy model in the consultation - Evidence and Innovation Strategy[55], provides an ideal operational model for developing and evaluating the success of existing policies and their delivery. Within this model there needs to be a greater recognition of the interaction between Defra's different strategic and policy outcomes and their integration with sectoral policies. This process is iterative and will lead to better understanding of the evidence base and thus improved policy development. The evidence base needs to be collectively re-evaluated to integrate single-issue concerns to support a more integrated ecosystem approach to policy development.

6. Defra should challenge its existing directorate and divisional structure to identify whether it is sufficiently adaptable to deliver integrated policies. Defra should consider establishing more crosscutting, temporary if appropriate, groups to ensure flexibility and integration of policy. Often there seems to be little account taken of the socio-economic consequences of policy; we note that science co-ordinators have been assigned to Defra policy divisions and assigning an economist and social scientist to policy divisions may ensure better integration of socio-economic aspects into policy making.

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[55] Evidence and Innovation Strategy 2005-2008, Consultation Document, 2005, Defra,

7. A more comprehensive review of the threats to the natural resources is required to determine the resulting priorities. A transparent prioritisation process then needs to be agreed.

8. Policy integration tools need to be examined further. These approaches and tools should be considered and their suitability assessed for implementation across relevant Defra and other government departments, e.g. the Policy Gateway process – used by the Welsh Assembly Government. Defra should consider adopting a similar scheme to the Rural Proofing process and checklist that departments are required to apply to both the design and delivery stages of all policies, programmes and initiatives and which then inputs into the RIA.

9. There is a clear need for Defra to develop a more coherent and joined up communication on their policies and their development with Local Government to optimise opportunities to protect the natural environment. The approach should consider how local activities, civil society, landowners and the private sector can more effectively work with Defra. There is scope to improve communication between Local Government and central Defra Departments so that there is a better understanding and clarity relating to the Defra Vision and related strategies and so that they can be more effectively championed locally. The many different government organisations with an interest in the natural environment often confounds the situation resulting in a complex network of relationships, funding streams to protect or enhance the natural environment and ownership of strategies.

10. It is not clear what mechanisms operate to ensure the overall accountability of Government Departments including Defra, Defra agencies and Local Authorities in implementing natural environment policies. The processes by which priorities are identified and then agreed and implemented need to be clearly understood before improvement measures can be made. We recognise there are often a range of interrelated drivers impacting the natural environment and, the complex nature of the natural environment policy framework – however, this should not be an excuse to more clearly articulate to society who is accountable for implementing natural environment policies and the processes for identifying priorities.

11. It is apparent that there is a significant dependency on agricultural policy to deliver natural environment outcomes, not least biodiversity outcomes and increasingly improvements in water quality especially in terms of control of diffuse pollution from farming practices. There is a risk that over dependence on agricultural policy to deliver natural environment outcomes may dilute what can be achieved;

12. Defra should consider whether existing spatial frameworks e.g. regional and local plans, etc could provide a suitable mechanism for guiding policy delivery locally or whether a different approach e.g. based on ecosystems or natural areas like joint character areas or catchments is more appropriate etc.

13. Further work is needed to understand and develop analytical tools to identify whether individual policies are working and whether the combined impact of a range of policies impacts on the functioning of an ecosystem. Indicators or targets that represent the functioning of ecosystems, the long-term health of the system and the services it performs for human benefit are required to evaluate policy success and the achievement of the Vision. If the ecosystem management approach is to be adopted further, research will be required to define objectives and targets.

14. Defra needs to develop a formal policy on consultation and stakeholder engagement to achieve a balance of views from all stakeholders. The process needs to be seen to be of benefit and that stakeholders can contribute effectively to the policy outcomes. The drivers behind public attitudes that embrace the protection of the environment should be investigated, to see whether any lessons could be learnt to improve engagement with the public and other stakeholders such as industry and regional authorities.

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Appendix 1: Policy templates

Policy	World Summit on Sustainable Development
Primary Theme or sector	Sustainable production/ consumption of natural resources
Related Themes or sectors	Agriculture, Biodiversity, Water, Soil, Climate Change, Energy
Type	Agreement
Policy origin	International
Policy driver	Political/ consumer pressure
Policy owner	Defra Environment and Sustainable Development International Division

Description

The World Summit on Sustainable Development was organised in Johannesburg in the autumn of 2002. The Summit sought to assess what progress had been made since Rio, and to promote action at all levels that would help eradicate poverty, change unsustainable consumption and production patterns and to ensure sustainable management and protection of natural resources.

The outcome of Johannesburg includes the Johannesburg plan of implementation, with concrete new targets and timetables for action, as well as a political declaration by Heads of State. Johannesburg also saw the launching of partnership agreement between governments, the private sector and the civil society. The UN Commission on Sustainable Development will review progress and promote implementation of the Johannesburg commitments.

Held in August/ September 2002, this Summit adopted the Johannesburg Declaration on Sustainable Development and the Plan of Implementation of the World Summit on Sustainable Development.

Targets*:*	Expected outcomes:
UK Government has introduced a number of sustainability targets and indicators including:	Global biodiversity outcome
	A sustainable farming and food chain
• Reduce/ halt rate of biodiversity loss by 2010	UK species and habitats part of a healthy functioning ecosystem on

• Reverse long-term decline of farmland and woodland birds by 2020	land, coast and sea
	Optimal soil functions performed for society
Sustainable development Public Service Agreement targets for England currently include biodiversity measures, for example:	
• 95% of SSSIs should be in good or recovering condition by 2010	
Plan of Implementation of the WSSD includes:	
• Poverty eradication	
• Halve, by the year 2015, the proportion of the world's people whose income is less than 1 dollar a day (i.e. in poverty) and the proportion of people who suffer from hunger	
• Halve, by the year 2015, the proportion of people who are unable to reach or to afford safe drinking water (as outlined in the Millennium Declaration) and the proportion of people who do not have access to basic sanitation	
• By 2020, achieve a significant improvement in the lives of at least 100 million slum dwellers, as proposed in the "Cities without slums" initiative.	
Changing unsustainable patterns of consumption and production	
• Prevent and minimise waste and maximise reuse, recycling and use of environmentally friendly alternative materials	
• Sound management of chemicals throughout their life cycle and of hazardous wastes for sustainable development as well as for the protection of human health and the environment, to ensure that, by 2020, chemicals are used and produced in ways that lead to the minimisation of significant adverse effects on human health and the environment	

Protecting and managing the natural resource base of economic and social development

- Develop integrated water resources management and water efficiency plans by 2005

- Ensure the sustainable development of the oceans, including application by 2010 of the ecosystem approach

- To achieve sustainable fisheries, maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015

- Sustainable agriculture and rural development: develop and implement integrated land management and water-use plans

- Achieve by 2010 a significant reduction in the current rate of loss of biological diversity – by promoting the sustainable use of biological diversity; strengthening national, regional and international efforts to control invasive alien species

Health and sustainable development

- Promote and develop partnerships to enhance health education with the objective of achieving improved health literacy on a global basis by 2010

- Develop programmes and initiatives to reduce, by the year 2015, mortality rates for infants and children under 5 by two thirds, and maternal mortality rates by three quarters of the prevailing rate in 2000

- Reduction of HIV prevalence among young men and women

Deleted:

aged 15 to 24 by 25% in the most affected countries by 2005, and globally by 2010, as well as combat malaria, tuberculosis and other diseases	
Comments: Targets are timebound and scientifically based.	**Comments**: Complements other policies/ legislation such as Birds and Habitats Directive and CBD.

Relationship with Defra Natural Environment vision:

Relates directly to Defra Natural Environment vision, particularly sustainable landscapes, biodiversity, replenished and restored ecosystems, sustainable management of ecosystems.

Relevant Government strategies and actions: National Parks and AONB Conservation Boards; Sustainable Farming and Food Strategy; England Forestry Strategy, Rural Strategy, ERDP land management measures.

Policy	EU Strategy for Sustainable Development
Primary Theme or sector	Sustainable production/ consumption of natural resources
Related Themes or sectors	Agriculture, Biodiversity, Water, Soil, Climate Change, Energy
Type	Agreement
Policy origin	EU
Policy driver	Political/ consumer pressure
Policy owner	Defra Environment and Sustainable Development International Division

Description

The EU Sustainable Development Strategy sets out a broad vision of what is sustainable. Ultimately, the economic, social and environmental dimensions of sustainability must go hand–in-hand and mutually reinforce one another. The Strategy seeks to improve the way in which we make policies, focusing on improving policy coherence and making people aware of possible trade offs between contradictory objectives so that informed policy-decisions can be taken. This requires that EU policy makers take into account the global context and actively promote consistency between internal and external policies and calls for investment in science and technology to support the adjustments needed for sustainable development. It insists on improving communication and addresses a limited number of trends that are not sustainable (e.g. climate change and energy use, threats to public health, poverty and social exclusion, ageing societies, management of natural resources, and land use and transport). It expands on some of the international goals and focuses on the priority objectives identified in the EU contribution to the World Summit on Sustainable Development (WSSD).

Targets*:*	Expected outcomes:
UK Government has introduced a number of sustainability targets and indicators including: • Reduce/ halt rate of biodiversity loss by 2010 • Reverse long-term decline of farmland and woodland birds by	Global biodiversity outcome A sustainable farming and food chain UK species and habitats part of a healthy functioning ecosystem on land, coast and sea

2020	Optimal soil functions performed for society
Sustainable development Public Service Agreement targets for England currently include biodiversity measures, for example: • 95% of SSSIs should be in good or recovering condition by 2010 Priorities are: • harnessing globalisation, • trade for sustainable development, • fighting poverty, • social development, • sustainable management of natural and environmental resources, • improving the coherence of European Union policies, • better governance at all levels • financing sustainable development	
Comments: Some targets are timebound and scientifically based.	**Comments**: Complements other policies/ legislation such as Birds and Habitats Directive and CBD.
Relationship with Defra Natural Environment vision:	

Relates directly to Defra Natural Environment vision, particularly sustainable landscapes, biodiversity, replenished and restored ecosystems, sustainable management of ecosystems.

Relevant Government strategies and actions: National Parks and AONB Conservation Boards; Sustainable Farming and Food Strategy; England Forestry Strategy, Rural Strategy, ERDP land management measures.

Transport

Policy	Transport – Terrestrial and Aviation
Primary Theme or sector	Environmental Protection
Related Themes or sectors	Air quality, Rural Affairs, Noise
Type	Primary – Policy Statements and Legislation; White Papers and Transport Acts. Secondary – Regulation and Economic Instruments; Fuel duty, VED and company car tax, various incentives
Policy origin	EC policy and national policy, international commitments
Policy driver	Politically driven – Labour Manifesto Commitments, international commitments
Policy owner	DfT

Description

The 1998 White Paper *A new deal for transport: better for everyone* outlined the policy framework which aims to develop a fully integrated transport system at all levels, including integration with the environment, affording it better protection. The *10 Year Plan for Transport* (2000) strategy, aims to tackle congestion and pollution through improvements to the entire transport system. Subsequent policy statements (*Aviation White Paper 2003, Future of Transport White Paper 2004*) have built on this framework to define transport policy over a longer time horizon. The approach is to see a balanced between transport development and respect for the environment.

Measures and activities have been employed across all transport modes including the introduction of local transport plans, strategies for sustainable distribution, cycling and walking to promote more sustainable travel choices and the increased protection for the environment through the New Approach to Appraisal (NATA) framework, addressing the impact of developments such as at airports through Legislation (e.g. Civil Aviation Bill) and the introduction of economic instruments such as differential fuel duty for clean fuels, VED and Company Car tax based on pollutant emissions and incentives for the purchase of clean vehicle technologies. Regulation of vehicle emissions through limit values, the emissions test cycle and roadside testing has also occurred over the last thirty years, now directly related to EU policy.

Targets: *directly related to the environment:*	**Expected outcomes**:
• to improve air quality by meeting our National Air Quality Strategy targets for carbon monoxide, lead, nitrogen dioxide, particles, sulphur dioxide, benzene and 1-3 butadiene • to reduce greenhouse gas emissions by 12.5% from 1990 levels, and move towards a 20% reduction in carbon dioxide emissions by 2010	Growth in the use of more sustainable transport modes (cycling, walking, bus and rail patronage) Reduction in the reliance on the car Growth in more sustainable distribution – less lorry kilometres Balanced approach to providing for growth in air capacity – internalising external costs of air transport
Comments: Targets derived from Defra NAQS (scientifically based) and the Kyoto Protocol	**Comments**: Policies should complement National Air Quality Strategy and Climate Change Programme provided that aviation outcomes are achieved.
Relationship with Defra Natural Environment vision: see vision transport document.	

Policy	Transport – Shipping and Ports
Primary Theme or sector	Environmental Protection
Related Themes or sectors	Transport Terrestrial and Aviation (see above), Pollution Prevention and Control
Type	Policy Statements and Legislation; White Papers, Transport and Harbours Acts
Policy origin	EC and National origins
Policy driver	Political Pressure - Manifesto Commitment on Transport in general, increasing international competition
Policy owner	DfT, DCLG

Description

Building on the wider 1998 White Paper; A new deal for transport: better for everyone, ports and shipping policy developed two subsequent policy statements; British Shipping: charting a new course (1998) and Modern Ports: a UK policy (2000). The key aims are to establish the best environmental practice in port development and use and the encouragement of sustainable distribution through short sea shipping. Legislation enshrining the environmental obligations and liabilities of Harbour Authorities and ship owners is in the form of the Harbour Act 1964 and Merchant Shipping Act 1995.

Measures and activities include the promotion of improvements to environmental performance of port operations and best standards in design through the use of the NATA framework and environmental assessments including EIAs. Planning guidance PPS11, PPG13 and PPG20 reinforce the policy statement objectives. Encouragement of water borne freight is also being supported through the Freight Facilities Grant (now the Sustainable Distribution Fund) and PPG13 protecting wharf sites and routes. The UK has also ratified the MARPOL 73/78 Convention of the International Maritime Organisation covering pollution prevention and control including oil, chemicals, harmful substances, garbage and sewage and since July 2005, air pollution.

Targets*: No specific environmental targets	**Expected outcomes**:
	Sustainable growth and consolidation of port facilities, including access to sites and proper consideration given to environmental management responsibilities.
	Shift in freight traffic from road to short sea shipping.
Comments: *N/A*	**Comments**: Policy has been designed to take account of obligations under Conservation (Natural Habitat) Regulations 1994, The Countryside Rights of Way Act 2000, Wild Birds and Habitats Directives and the Sustainable Development Strategy 1999.
Relationship with Defra Natural Environment vision: see vision transport document.	

Policy	Rural Transport Policy
Primary Theme or sector	Rural Issues
Related Themes or sectors	Transport Terrestrial and Aviation (see above), Environmental Protection, Accessibility
Type	Policy Statements and Legislation; White Papers, Transport Act Secondary- fiscal incentives
Policy origin	National and European policy
Policy driver	Political and consumer pressure
Policy owner	DfT and Defra Natural Resources and Rural Affairs

Description

The policy statements within the *Rural White Paper; Our countryside: the future* 2000 and the *Transport White Paper; A new deal for transport: better for everyone* 1998 provide the policy framework for two key themes within rural transport. The first is improved access to services and a reduction in social exclusion and the second, a reduction in the impact of transport in rural areas.

Improvements to public transport and the provision of essential services in rural areas has been provided for through various schemes and grants, the formation of Rural Transport Partnerships and the publishing of *'Integrated Transport Measures in National Parks: A good practice guide'.* Tax breaks and fiscal incentives have been provided for car users to reduce the burden on rural households. Road safety measures and bypasses have been proposed to reduce traffic impact on historic and sensitive areas.

Targets*:*	**Expected outcomes**:
remove fuel duty on lead replacement petrol, extend reduced VED to cars up to 1500cc; increase by a third the number of rural households with a regular bus service within 10 minutes walk by 2010*; promote flexible transport schemes through 500 more Rural Transport Partnership and Parish Grants by 2003	Improvement in the access to services for the rural population through investment in public transport, service provision and greater flexibility of services provided including greater community involvement. A reduction in the impact of traffic in sensitive rural areas.
Comments: 10 year transport plan targets* have a 2010 horizon. Taxation targets do not specify a time horizon.	**Comments**: Largely complements other Defra policy, although targets regarding removal of fiscal incentives for fuel and VED is contrary to Climate Change policy
Relationship with Defra Natural Environment vision: see vision transport document	

Policy	Energy – environment policy (excluding Defra Energy policy)
Primary Theme or sector	Energy
Related Themes or sectors	Planning, agriculture, industry
Type	Primary: policy statements, legislation and regulations; White Paper, Acts. Secondary: include fiscal measures and forum processes
Policy origin	EC policy, International agreements and national policy
Policy driver	Political pressure and scientific evidence
Policy owner	DTI

Description

Energy policy within the DTI has two broad policy strands in relation to the environment, the first is the environmental impact of energy development, operation and decommissioning and the second is the more sustainable production of energy through renewable processes. The energy White Paper *our energy future: creating a low carbon economy 2003* and the Energy Act 2004 provide the policy framework for the future of energy policy. Specific measures are dealt with on a sectoral basis:

Renewables and Coal: *Renewables obligation order 2002* requires electricity suppliers to source a percentage of their energy supplies from renewable sources, the *Energy Act 2004* established the legal framework for offshore renewable energy development, fiscal incentives to promote take up of renewable energy technologies both commercially and domestically and the *Carbon abatement technologies strategy* and *Hydrogen strategy 2005* to promote the development of clean and efficient coal technologies, carbon sequestration and hydrogen demonstration programmes, The *Coal Energy Paper 67: cleaner coal technologies future* also promotes plans for the reduction in environmental impact of coal power stations.

Nuclear: The 2003 White Paper policy committed to keeping the nuclear option open, sustaining existing plant and dealing with decommissioning. Regulation of radioactive substances and disposal is through the *Radioactive Substances Act 2003* and measures to address decommissioning through the *2002 Managing the nuclear legacy – a strategy* and the *Energy Act 2004,* establishing the Nuclear Decommissioning Authority. *EC Nuclear Reactors Regulations 1999* govern the requirement for EIA for decommissioning.

Oil and Gas: Offshore development and discharge is governed by the *Petroleum Act 1998* and *Prevention of Oil Pollution Act 1971* and a series of regulations including the *Habitats and Wild Birds Directives* and requirements for EIA. Onshore, a series of Acts, regulations and directives both at national and EC level relating to planning, the environment and pipeline operations govern development. Yearly licensing rounds provide permits to companies to prospect for on- and offshore supplies; new license types for small operators and Atlantic margin surveying boosted applications in 2003 and 2004.

Targets*: environment related*	**Expected outcomes**:
10% UK electricity in 2010 from renewable sources	A reduction in and better management of the environmental impact of the energy sector (particularly in relation to climate change, air quality and nuclear waste)
	Further development in North Sea Oil grounds (with strengthened legislation surrounding petroleum pollution prevention and control regulation)

Comments: target is scientifically based to achieve a reduction in carbon emissions for the Kyoto Protocol commitment (see climate change policy)	**Comments**: Most policy outcomes are complementary to and have been developed alongside environmental policy, such as NAQS and CCP. Developments in nuclear power and oil and gas fields may impact on other environmental policy Offshore development is link to biodiversity and industry regulation under Defra and DTI
Relationship with Defra Natural Environment vision: see energy vision document.	

Policy	Pollution Prevention and Control
Primary Theme or sector	Industry – air and water protection, waste management
Related Themes or sectors	Relates to other areas, including biodiversity protection.
Type	PPC Act is primary legislation, supported by secondary legislation and guidance produced by EA
Policy origin	PPC derives from EU 1996 IPPC Directive.
Policy driver	Driven by EU. However, this itself was driven by UK and other pressure on EU (ie UK IPC). This in turn responded to pressures from RCEP, etc.
Policy owner	Environment Agency

Description

Pollution Prevention and Control is a regime for controlling pollution from certain industrial activities. The regime introduces the concept of Best Available Techniques ("BAT") to environmental regulations. Operators must use the BAT to control pollution from their industrial activities. The aim of the BAT is to prevent, and where that is not practicable, to reduce to acceptable levels, pollution to air, land and water from industrial activities. BAT also aims to balance the cost to the operator against benefits to the environment. PPC is replacing that of Integrated Pollution Control (established by the Environmental Protection Act 1990) and is taking effect between 2000 and 2007.

Targets*:*	**Expected outcomes**:
• PPC does not set specific environmental targets per se. It aims to: • Reduce pollution, etc, due to operation at the level of BAT • Emissions should not lead to a breach of environmental quality standards adopted at EU *level (air, water, biodiversity, etc)*	PPC should deliver some significant reductions in pollutant emissions and improvements in resource use and energy efficiency. Some will build on IPC practice, but for some installations such regulation is new (eg animal units), so the outcomes will be likely to be greater than previous practice

Comments: Targets, if these can be so described, are technically based	**Comments**: PPC contributes significantly to other policy areas as it provides a key delivery tool to control industrial emissions to meet other media based policy objectives. The procedures of PPC do, however, set some limits on policy initiatives, eg emissions trading for acid gases is particularly problematic due to requirements in permit conditions. PPC, therefore, limits options for policy flexibility
Relationship with Defra Natural Environment vision:	

Policy	Common Agricultural Policy
	Including Single Farm Payment (and as part of SFP: Cross-compliance (Council Regulation No 1782/2003 and Commission Regulation No 796/2004))
Primary Theme or sector	Agriculture
Related Themes or sectors	Biodiversity, Water, Soil, Landscape, Forestry
Type	Grant/ legislation
Policy origin	EC
Policy driver	Political pressure
Policy owner	Rural Payments Agency

Description

Aimed at heading off the risks of environmental degradation, while encouraging farmers to continue to play a positive role in the maintenance of the countryside and the environment by targeted rural development measures and by contributing to securing farming profitability in the different EU regions.

The 2003 CAP reform maintains the nature of the agri-environment schemes as being obligatory for Member States, whereas they remain optional for farmers. In addition, the maximum EU co-financing rate has increased to 85% in Objective 1 areas and to 60% in other areas.

The agri-environmental strategy of the CAP is largely aimed at enhancing the sustainability of agro-ecosystems. The measures set out to address the integration of environmental concerns into the CAP encompass environmental requirements (cross-compliance) and incentives (e.g., set aside) integrated into the market and income policy, as well as targeted environmental measures that form part of the Rural Development Programmes (e.g., agri-environment schemes).

Cross-compliance is a core instrument. The 2003 CAP reform also involves decoupling most direct payments from production. The principle that farmers should comply with environmental protection requirements as a condition for benefiting from market support was incorporated into the Agenda 2000 reform. The 2003 reform put greater emphasis on cross-compliance which has become compulsory.

Targets*:*	**Expected outcomes**:
• 2,500 agri-environment schemes by 2005-06 • Majority of farmland under entry level agri-environment scheme within three years • Reduce/ halt rate of biodiversity loss by 2010 (in some EU Member States, land abandonment and the withdrawal of traditional management may become a threat to biodiversity on farmland) • Reverse long-term decline of farmland and woodland birds by 2020 Examples of environmental conditions are adherence to maximum stocking rates for cattle or sheep, compliance with specific conditions for the cultivation of sloping land, respect of maximum permitted volumes of fertilizers per hectare, and compliance with specific rules concerning the use of plant protection products. The priorities of the Biodiversity Action Plan for Agriculture are: - the promotion and support of environmentally-friendly farming practices and systems that benefit biodiversity directly or indirectly; - the support of sustainable farming activities in biodiversity-rich areas; - the maintenance and enhancement of good ecological infrastructures, - the promotion of actions to conserve local or threatened livestock breeds or plant varieties.	A sustainable farming and food chain Optimal soil functions performed for society Land use outcome UK species and habitats part of a healthy functioning ecosystem on land, coast and sea Examples of commitments covered by national/regional agri-environmental schemes are: - environmentally favourable extensification of farming; - management of low-intensity pasture systems; - integrated farm management and organic agriculture; - preservation of landscape and historical features such as hedgerows, ditches and woods; - conservation of high-value habitats and their associated biodiversity. Across the EU, the share of agricultural land enrolled in agri-environmental measures in total agricultural area has increased from 15% in 1998 to 27% in 2001.

Comments:	Comments:
Targets are timebound and scientifically based.	Complement other policies/ legislation such as Birds and Habitats Directive, CBD, WSSD.

Relationship with Defra Natural Environment vision:

Relates directly to Defra Natural Environment vision, particularly soil functions, sustainable landscape, replenished and restored ecosystems, sustainable management of ecosystems, achieving a sustainable economy.

Relevant Government strategies and actions: Sustainable Farming and Food Strategy; England Forestry Strategy, Rural Strategy, Soil Action Plan, ERDP land management measures, catchment sensitive farming programme.

Policy	Agri-Environment Regulation EEC/2078/92
Primary Theme or sector	Agriculture
Related Themes or sectors	Biodiversity, Water, Soil, Landscape, Forestry
Type	Grant/ legislation
Policy origin	EC
Policy driver	Political pressure
Policy owner	Defra Conservation Uplands and Rural Europe Division (CURE)

Description

Agri-environment programmes, under Council Regulation (EEC) 2078/92 of 30 June 1992 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside, exist in all Member States to promote farming compatible with environmental objectives. Many measures have been developed to favour farm-dependent biodiversity, including plant species, invertebrates, mammals and birds. These measures include reducing the use of inputs and the fertility of soil; introducing farming systems (crops, grazing patterns, and rotations) needed by various species; and schedulingor adjusting farm activities to fit into the natural cycle.

This Regulation allowed member states to implement voluntary schemes which included payment to landowners for managing land for public access and leisure activities. The main schemes under which this new public access was provided in England were Environmentally Sensitive Areas (ESA) and Countryside Stewardship (CSS). New environmental stewardship schemes have since been introduced (Entry Level Stewardship and Higher Level Stewardship in England).

Monitoring of these programmes is continuing in the context of programme management by Member States. The European Commission's proposed Rural Development Regulation incorporates this agri-environment regulation.

Targets*:*	**Expected outcomes**:

- 2,500 agri-environment schemes by 2005-06

- Majority of farmland under entry level agri-environment scheme within three years

- Reduce/ halt rate of biodiversity loss by 2010 (in some EU Member States, land abandonment and the withdrawal of traditional management may become a threat to biodiversity on farmland)

- Reverse long-term decline of farmland and woodland birds by 2020

Examples of environmental conditions are adherence to maximum stocking rates for cattle or sheep, compliance with specific conditions for the cultivation of sloping land, respect of maximum permitted volumes of fertilizers per hectare, and compliance with specific rules concerning the use of plant protection products.

The priorities of the Biodiversity Action Plan for Agriculture are:

- the promotion and support of environmentally-friendly farming practices and systems that benefit biodiversity directly or indirectly;

- - the support of sustainable farming activities in biodiversity-rich areas;

- the maintenance and enhancement of good ecological infrastructures;

- te promotion of actions to conserve local or threatened livestock breeds or plant varieties.

A sustainable farming and food chain

Optimal soil functions performed for society

Land use outcome

UK species and habitats part of a healthy functioning ecosystem on land, coast and sea

Examples of commitments covered by national/regional agri-environmental schemes are:

- environmentally favourable extensification of farming;

- management of low-intensity pasture systems;

- integrated farm management and organic agriculture;

- preservation of landscape and historical features such as hedgerows, ditches and woods;

- conservation of high-value habitats and their associated biodiversity.

Across the EU, the share of agricultural land enrolled in agri-environmental measures in total agricultural area has increased from 15% in 1998 to 27% in 2001.

Comments:	Comments:
Targets are timebound and scientifically based.	Complements other policies/ legislation such as Birds and Habitats Directive, CBD, WSSD, CAP.

Relationship with Defra Natural Environment vision:

Relates directly to Defra Natural Environment vision, particularly soil functions, sustainable landscape, replenished and restored ecosystems, sustainable management of ecosystems, achieving a sustainable economy.

Relevant Government strategies and actions: CAP cross compliance, Sustainable Farming and Food Strategy; England Forestry Strategy, Rural Strategy, Soil Action Plan, ERDP land management measures, catchment sensitive farming programme.

Policy	Rural Development Regulation
Primary Theme or sector	Agriculture
Related Themes or sectors	Biodiversity, Water, Soil, Landscape, Forestry
Type	Legislation
Policy origin	EC
Policy driver	Political pressure
Policy owner	Defra Rural Funding Review Division

Description

The EU Rural Development Regulation will replace current Council Regulation 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) under the second pillar of the Common Agricultural Policy which remains in force until the end of 2006. This is currently implemented in England through the schemes of the England Rural Development Programme (ERDP).

The Rural Development policy focuses on three key areas: the agri-food economy, the environment and the rural economy and population. The new rural development strategies and programmes will be built around a competitiveness axis for agriculture, food and forestry (to target human and physical capital in the agriculture, food and forestry sectors), a land management-environment axis (to protect and enhance natural resources and preserve high nature value farming and cultural landscapes) and a quality of life/diversification axis in rural areas (to develop local infrastructure and human capital in rural areas to improve conditions for growth and job creation and diversification of economic activities). A fourth axis based on experience with the Leader programme introduces possibilities for locally based bottom-up approaches to rural development.

The European Commission's proposed Rural Development Regulation incorporates the agri-environment regulation EEC 2078/92. Compliance with minimum environmental standards is a condition for eligibility for support under several different rural development measures, such as assistance for investments in agricultural holdings setting-up of young farmers and improving the processing and marketing of agricultural products. Only environmental commitments above the reference level of Good Farming Practice (GFP) qualify for agri-environment payments. The support to less-favoured areas also require the respect of the codes of GFP.

Targets*:*

- 2,500 agri-environment schemes by 2005-06

- Majority of farmland under entry level agri-environment scheme within three years

- Reduce/ halt rate of biodiversity loss by 2010 (in some EU Member States, land abandonment and the withdrawal of traditional management may become a threat to biodiversity on farmland)

- Reverse long-term decline of farmland and woodland birds by 2020

The new Rural Development Regulation, and an accompanying proposal on

CAP financing includes:

- establishment of a special fund (EAFRD), separate from the normal CAP mechanisms, with simper financial rules;

- a requirement for European and national strategy documents;

- four priority axes for spending (axis I agricultural and forestry competitiveness; axis II land management; axis III wider rural and axis IV Leader a horizontal delivery mechanism), with detailed measures under each axis;

- the requirement that a minimum of 25% of community support for each rural development programme to be spent on land management, and a minimum of 10% to be committed to Axis I and III;

Expected outcomes:

A sustainable farming and food chain

Optimal soil functions performed for society

Land use outcome

UK species and habitats part of a healthy functioning ecosystem on land, coast and sea

Examples of commitments covered by national/regional agri-environmental schemes are:

- environmentally favourable extensification of farming;

- management of low-intensity pasture systems;

- integrated farm management and organic agriculture;

- preservation of landscape and historical features such as hedgerows, ditches and woods;

- conservation of high-value habitats and their associated biodiversity.

Across the EU, the share of agricultural land enrolled in agri-environmental measures in total agricultural area has increased from 15% in 1998 to 27% in 2001.

Protection of biodiversity has made steps forward with the implementation of Natura 2000 (around 12-13% of agricultural and forestry area has been designated).

Axis IV significantly strengthens the role of Leader (funding for local action groups in rural communities) within rural development programmes with a minimum spend of 5% needing to be spent through the Leader approach

Priorities for Rural Development (2007-2013):

- improving competitiveness of the agricultural and forestry sectors

- improving the environment and countryside (contributing to implementation of Natura 2000 network and commitment to reverse biodiversity decline by 2010)

- improving quality of life in rural areas and encouraging diversification;

- building local capacity for employment and diversification

- translating priorities into programmes;

- complementarily between Community instruments

Comments:	**Comments**:
Targets are timebound and scientifically based.	Complements other policies/ legislation such as Birds and Habitats Directive, CBD, WSSD, CAP.

Relationship with Defra Natural Environment vision:

Relates directly to Defra Natural Environment vision, particularly soil functions, sustainable landscape, replenished and restored ecosystems, sustainable management of ecosystems, achieving a sustainable economy.

Relevant Government strategies and actions: CAP cross compliance, Sustainable Farming and Food Strategy; England Forestry Strategy, Rural Strategy, Soil Action Plan, ERDP land management measures, catchment sensitive farming programme.

Policy	EU Water Framework Directive (WFD) 2000/60/EC
Primary Theme or sector	Water (holistic approach including water resources, water quality, ecology).
Related Themes or sectors	Agriculture, fishing, power generation, industry, transport, tourism.
Type	Legislation
Policy origin	European Commission (EC). The Council of Ministers and the European Parliament were jointly responsible for the final text of the WFD.
Policy driver	During the 1990s the EC recognised the need to find a better way of managing the water environment. Although numerous water related directives existed, they tended to address specific issues, thus the whole approach was fragmented and some issues such as groundwater and aquatic ecosystems were not given enough priority. To help develop the WFD, experts from industry, agriculture, environmental and consumer organisations, and local and national authorities were consulted.
Policy owner	Defra are responsible for 'owning' the WFD in England. The rest of the UK is the responsibility of the Welsh National Assembly, the Scottish Executive and the Northern Ireland Department of the Environment. Where River Basin Districts overlap, responsibilities are shared between the relevant authorities. In Northern Ireland, agreements are being set up with Southern Ireland to manage international River Basin Districts. The Environment Agency is the 'competent authority' chosen by Defra, responsible for implementing the WFD in England and Wales. In Scotland this role has been given to the Scottish Environment Protection Agency (SEPA) and in Northern Ireland it is the responsibility of the Environment and Heritage Service (EHS).

Description

The WFD is the most comprehensive piece of water legislation ever produced by the EC. Its aim is to sustainably manage and improve the water environment. The key target of the WFD is that all surface waters and groundwaters within defined river basin districts reach at least 'good status' by 2015. There is a strong focus on preventing pollution at source and the WFD sets out control mechanisms to ensure that pollution sources (particularly diffuse sources e.g. from agriculture) are managed in a sustainable way. Groundwater and aquatic ecosystems are also specifically targeted for protection. Key elements of the WFD that make this legislation so different include the fact that it targets protection of all waters, the requirement for cross border co-operation between countries, active participation of all stakeholders, and water pricing policies, including the 'polluter pays' principle.

The WFD will be implemented in each member state using the River Basin Planning Process:

All water bodies will be allocated to *River Basin Districts (RBDs).* These will act as the basic water management unit. Specific water bodies and the pressures upon them will be identified.

Environmental objectives that signify 'good status' will be established for each water body. *Environmental Quality Standards (EQS)* are being prepared by the EC to define good chemical status.

Monitoring programmes will be established in each RBD..

River Basin Management Plans (RBMPs) will be produced for each RBD and will include an analysis of the river basin's characteristics, a review of the impact of human activity on water, and an economic analysis of water use.

Each RBMP will also include a *Programme of Measures (POM),* i.e. actions required to meet WFD objectives. Both RBMPs and associated POMs must be reviewed and updated every 6 years.

The WFD entered into force in December 2000 and was adopted into UK law in December 2003, following a public consultation exercise. Nine RBDs have been designated within England and Wales, and 2 have been identified as partly in England (partly Scotland).

Targets*:* • December 2003: National and regional water laws must be adapted to the WFD and river basin co-operation must become operational. • December 2004: An analysis of pressures and impacts on water bodies must be completed and include an economic analysis. • December 2006: Monitoring programmes must become operational. • December 2008: River Basin Management Plans must be presented to the public. • December 2009: River Basin Management Plans must be published. • December 2015: **All waters must achieve 'good status'.**	**Expected outcomes**: A healthy water environment, with good chemical and ecological status.
Comments: It is acknowledged within the scientific community that the UK is unlikely to achieve 'good status' of all its water bodies by 2015. This is partly because our water resources are heavily polluted, particularly from agriculture, but also because positive changes to ecological status can take decades to achieve once chemical water quality has improved. There has also been much debate as to what exactly constitutes 'good status' in terms of water chemistry and ecology.	**Comments**: The WFD encourages, and in some cases requires, the integration of policies and actions that can contribute to improving water quality. Where existing legislation fails to promote good water quality, member states must identify this and design additional measures to satisfy all relevant WFD objectives. The 3 directives relating to surface water abstraction will be replaced by the WFD in 2007. In 2013 the Freshwater Fish Directive, the Shellfish Directive, the Groundwater Directive and the Dangerous Substances Directive will also be replaced by the WFD.

Relationship with Defra Natural Environment vision: The WFD fulfils many of the criteria under Defra's Natural Environment Vision.

By striving to provide a clean water environment with good aquatic ecology, the WFD contributes to the following values: resources for basic survival and good health (clean water for drinking and bathing), natural processes (nutrient and water cycling), resources for a strong and healthy economy (landscapes and amenities for tourism and recreation), places for recreation (natural environment), and social and cultural benefits (biodiversity, natural environment). The WFD also helps the UK in its aspiration towards better water quality, through a holistic and sustainable approach.

Policy	National air quality strategy and supporting legislation on ambient air quality
Primary Theme or sector	Air protection
Related Themes or sectors	Relates to biodiversity protection, health protection, industry and transport as emission sources
Type	NAQS contains both specific legal provisions and guidance
Policy origin	Combination of international, EC and national.
Policy driver	Some is derived from EU and international drivers (eg specific limit values, National Emission Ceilings Directive, etc)
Policy owner	AEQ [in Defra] is main owner, with implementing support from EA and local authorities

Description

Under the Environment Act 1995 the Secretary of State is to prepare a National Air Quality Strategy including standards and objectives for air quality, and measures to be taken by local authorities. District and unitary authorities are given a duty to review air quality, and to designate areas where standards are likely to be breached as AQMAs. For each AQMA, the responsible authority must prepare an action plan and take measures to meet the required standards. County Councils may make recommendations to District Councils in relation to air quality, and must submit proposals for the exercise of their powers as input to District Councils' AQMA action plans. This provision recognizes the need for compatible action between District and County authorities so as to secure a coordinated approach in areas such as transport planning. The government's air quality strategy was first published in March 1997 and has been updated a number of times. This sets out health-based *standards* and *objectives* for eight pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, ozone, PM10, and sulphur dioxide). However, for all but 1,3-butadiene, these have been overtaken by limit values adopted by the EC (see below). The latest version of the Strategy proposed different objectives in Scotland, Northern Ireland and London to the rest of the UK. The Mayor of London issued a strategy for London in 2001 proposing measures to improve air quality, but indicating that achieving even the more lenient standards in the government's proposals would be difficult.

In general, the UK has made very little use of economic, or market-based, instruments for air pollution control. Air pollution policy has included the discretionary grants made by local authorities to householders installing new equipment in smokeless zones, and the tax differential in favour of unleaded petrol.

Air limit values: these derive from EC Directive 96/62 and daughter Directives and have established limit values for SO2, NOx and NO2, PM10, lead, benzene and non-binding objectives for ozone and arsenic, cadmium, nickel, mercury and PAHs.

National emission ceilings Directive (2001/81): this sets UK national emission ceilings for sulphur dioxide (SO_2), nitrogen oxides (NO_X), volatile organic compounds (VOC) and ammonia (NH_3). The limits are set out below. They are no stricter than those derived from international obligations (UNECE). The primary aim is to reduce acidification and eutrophication, although there are also knock-on benefits for ambient air quality. It is expected that existing measures (including Large Combustion Plant Directive) will meet these requirements.

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Targets*:*	Expected outcomes:
The NAQS sets out various AQ objectives for the country, by region (as described above). Air limit values: obligatory limits are set for SO2, NOx, lead, PM10 and benzene. These are too detailed to set out in this table. NECD UK limits are (kilotonnes) SO2: 585, NOx: 1167, VOC: 1200, NH3: 297.	There is expected to be significant reduction in exceedence of critical loads for acid deposition and eutrophication. Note that merely meeting UK reductions is not the only driver, as reductions from other Member States will contribute to UK outcomes. Meeting air limit values will reduce health disbenefits. However, the science is changing rapidly, so that the exact relationship (eg dose effects) of limit values with health impacts is changing, not least the continued impacts below the legal requirements. Thus it is clear that meeting legal requirements will deliver health outcomes, but not prevent some health problems remaining.
Comments: The limits derive from EPAQS (science based), EC law (mix of science-based, effects-based and political compromise) and practicability. It is not always clear to stakeholders what the basis for specific numbers is.	**Comments**: air quality policy contributes to biodiversity and health policies. It is assisted by other policy areas (eg on vehicle and industrial emissions and land-se planning relating to transport).
Relationship with Defra Natural Environment vision:	

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Policy	1979 Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)
	82/72/EEC
Primary Theme or sector	Biodiversity
Related Themes or sectors	
Type	Agreement
Policy origin	EC
Policy driver	Political Pressure, scientific evidence
Policy owner	Defra Global Wildlife Division

Description

The 1979 Convention on the Conservation of European Wildlife and Natural Habitats came into force in 1982. The Convention aims to conserve wild flora and fauna in their natural habitats, particularly endangered species, and especially when conservation requires the co-operation of several states. Contracting parties are required to take measures to conserve wild flora and fauna at a level which corresponds to ecological, scientific and cultural requirements and, in particular, to take measures to protect the habitats and species listed in the Convention's three Appendices. These Appendices include an extensive range of plant and animals species, including marine species.

The Convention thus protects over 500 wild plant species and more than 1000 wild animal species. It is open (not limited to Europe) and is now in force in 40 member states. The Birds and Habitats Directives provide the framework within which the provisions of the Bern Convention are applied.

Targets*:*	**Expected outcomes**:
To ensure the conservation of European wildlife and natural habitats by means of cooperation between States.	Wildlife management outcome

The parties undertake to:	Global biodiversity outcome
- promote national policies for the conservation of wild flora, wild fauna and natural habitats; - integrate the conservation of wild flora and fauna into national planning, development and environmental policies; - promote education and disseminate information on the need to conserve species of wild flora and fauna and their habitats.	UK species and habitats part of a healthy functioning ecosystem on land, coast and sea
Comments: Framework follows Birds and Habitats Directives.	**Comments**: Complements Birds and Habitats Directives, CBD, and other biodiversity legislation. Influenced the UK's main conservation legislation (the Wildlife and Countryside Act 1981 (and as amended)).

Relationship with Defra Natural Environment vision:

Relates to biodiversity and sustainability visions.

Relevant Government strategies and actions: Biodiversity Strategy, Strategic species specific wildlife plans, BAPs, National Nature Reserves, SPAs, SACs, Natura 2000 and Ramsar designations.

Policy	Council Directive 79/409/EEC on the conservation of wild birds ("Birds Directive")
Primary Theme or sector	Biodiversity
Related Themes or sectors	
Type	Legislation
Policy origin	EC
Policy driver	Scientific evidence, political/ consumer pressure.
Policy owner	Defra Global Wildlife Division/ European Wildlife Division

Description

The Directive covers protection, management and control of naturally occurring birds in the wild state, and lays down rules for their exploitation. A large number of species of wild birds naturally occurring in the European territory of the Member States are declining in number. This decline represents a serious threat to the conservation of the natural environment, particularly because of the biological balances threatened thereby. The species of wild birds naturally occurring in the European territory of the Member States are mainly migratory species; such species constitute a common heritage and effective bird protection is typically a trans-frontier environment problem entailing common responsibilities. The measures to be taken must apply to the various factors which may affect the numbers of birds (man's activities, the destruction and pollution of their habitats, capture and killing by man and the trade resulting from such Practices). The stringency of such measures should be adapted to the particular situation of the various species within the framework of a conservation policy.

Certain species of birds should be the subject of special conservation measures concerning their habitats in order to ensure their survival and reproduction in their area of distribution. Such measures must also take account of migratory species and be coordinated with a view to setting up a coherent whole. In order to prevent commercial interests from exerting a possible harmful pressure on exploitation levels it is necessary to impose a general ban on marketing and to restrict all derogation to those species whose biological status so permits, account being taken of the specific conditions obtaining in the different regions.

Targets*:*	**Expected outcomes**:
• 95% nationally important wildlife sites by 2010 • Reverse long-term decline of farmland and woodland birds by 2020 • Reduce/ halt rate of biodiversity loss by 2010 The Birds Directive requires the UK: • Implement measures, including the creation of protected areas, to maintain a sufficient diversity of habitats for all European bird species; • Take special measures to conserve the habitats of rare and vulnerable species and all species listed in the Birds Directive Annex 1 (i.e. those regularly occurring migratory species). The Special measures required include designation and protection from deterioration of Special Protection Areas, in order to encourage re-establishment of the necessary diversity and extent of habitat.	Wildlife management outcome Global biodiversity outcome UK species and habitats part of a healthy functioning ecosystem on land, coast and sea The Commission will prepare and transmit to the Member States a composite report based on information submitted by the Member States on the application of national provisions introduced. This report will be produced every three years. Scientific research carried out will make it possible to assess the effectiveness of measures taken as part of this Directive.
Comments: Targets are scientifically based and timebound.	**Comments**: Complements CBD, Habitats Directive, Bern and Bonn Conventions, CITES.
Relationship with Defra Natural Environment vision: Relates to biodiversity, natural heritage, interaction with natural environment, and sustainable living landscape visions. Relevant Government strategies and actions: Biodiversity Strategy, Strategic species specific wildlife plans, BAPs, National Nature Reserves, SPAs, SACs, Natura 2000 and Ramsar designations.	

Policy	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention/ CMS)
Primary Theme or sector	Biodiversity
Related Themes or sectors	Marine, water
Type	Agreement
Policy origin	UNEP Intergovernmental treaty
Policy driver	Political pressure, scientific evidence
Policy owner	Defra Global Wildlife Division/ European Wildlife Division

Description

Aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty (under the United Nations Environment Programme), concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership currently (as of 1 August 2005) includes 92 Parties from Africa, Central and South America, Asia, Europe and Oceania.

Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties must protect these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.

Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range States to conclude global or regional Agreements. The Agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions.

Targets*:*	**Expected outcomes**:
Reduce/ halt rate of biodiversity loss by 2010	Wildlife management outcome
The Parties:	Global biodiversity outcome
- should promote, co-operate in and support research relating to migratory species;	UK species and habitats part of a healthy functioning ecosystem on land, coast and sea
- will endeavour to provide immediate protection for migratory species included in Appendix I; and	The UK has currently ratified four legally binding Agreements under the CMS:
- will endeavour to conclude Agreements covering the conservation and management of migratory species included in Appendix II.	- the Agreement on the Conservation of Populations of European Bats (EUROBATS);
	- the African-Eurasian Migratory Waterbird Agreement (AEWA);
	- the Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas (ASCOBANS0;
	- the Agreement on the Conservation of Albatrosses and Petrels (ACAP).
	The UK has also ratified the MoU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia, in respect of the British Indian Ocean Territory, and has ratified the MOU Concerning Conservation Measures for the Aquatic Warbler.
Comments:	**Comments**: Complements Bern Convention, CBD, Birds and Habitats Directive and other biodiversity initiatives.
Relationship with Defra Natural Environment vision: Relates to biodiversity and sustainability visions. Relevant Government strategies and actions: Biodiversity Strategy, Strategic species specific wildlife plans.	

Policy	Convention on Biological Diversity
Primary Theme or sector	Biodiversity
Related Themes or sectors	Landscape, soil, water, agriculture, forestry.
Type	Agreement
Policy origin	International treaty with 188 parties; 168 signatures (Earth Summit, Rio de Janeiro)
Policy driver	Scientific evidence, political and consumer pressure.
Policy owner	Defra Environment and Sustainable Development International/ JNCC

Description

The objectives of this 1992 UNECE Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources. Contracting parties to the Convention are required to integrate, as far as possible and as appropriate, the conservation of biological diversity into their plans and programmes. The Convention requires the identification, regulation and management of processes and categories of activities that may adversely affect biodiversity.

The Convention translates its guiding objectives of conservation, sustainable use and equitable sharing of benefits into binding commitments in its substantive provisions contained in Articles 6 to 20. These articles contain key provisions on, for example, measures for the conservation of biological diversity (in situ and ex situ); incentives for the conservation and sustainable use of biological diversity; research and training; public awareness and education; assessing the impacts of projects upon biological diversity; regulating access to genetic resources; and the provision of financial resources.

The Convention establishes institutional arrangements which provide a mechanism for the further development of, and for monitoring the implementation of, the Convention through meetings, work programmes, reviews and negotiations. Three institutions are established by the Convention: the Conference of the Parties (COP), the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) and the Secretariat. The Convention also establishes a financial mechanism for the provision of financial resources to developing country Parties, and provides for the establishment of a clearing-house mechanism (CHM) for scientific and technical cooperation.

The Biodiversity Action Plan process is a key part of the UK and country level Biodiversity Strategies. The Biodiversity Strategies require monitoring of progress and of the targets and indicators identified for habitats and species.

Targets*:*	**Expected outcomes**:
• BAP Habitats and species specific targets • Target condition of SSSIs (72% by April 2006; 83% by April 2008) • 95% nationally important wildlife sites by 2010 • Reverse long-term decline of farmland and woodland birds by 2020 • Reduce/ halt rate of biodiversity loss by 2010 2010 Target: Goal 1: Promote the conservation of the biological diversity of ecosystems, habitats and biomes. Targets: At least 10% of each of the world's ecological regions effectively conserved; Areas of particular importance to biodiversity protected. Goal 2: Promote the conservation of species diversity. Targets: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups; Status of threatened species improved. Goal 3: Promote the conservation of genetic diversity. Targets: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.	Wildlife management outcome Global biodiversity outcome UK species and habitats part of a healthy functioning ecosystem on land, coast and sea The philosophy of sustainable development, the ecosystem approach, and the on building partnerships are helping to shape global action on emphasis biodiversity. Challenges still lie in the expected rise in human population and expansion of consumer revolution. Forest biodiversity: - progress made on the implementation of the expanded programme of work on forest biological diversity is a significant contribution to achieving the 2010 target and achieving sustainable forest management at national, regional, and global levels. Agricultural biodiversity: - postponement of the preparation of the final report of the comprehensive assessment of agricultural biological diversity and related milestones by two years. - report of the FAO on the potential impacts of genetic use restriction technologies on agricultural biodiversity and agricultural production systems Biological diversity of dry and sub-humid land: - many expected outcomes and timeframes on http://www.biodiv.org/doc/handbook/cbd-hb-10-07-en.pdf

Goal 4: Promote sustainable use and consumption. Targets: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity; Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced; No species of wild flora or fauna endangered by international trade. Goal 5: Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced. Targets: Rate of loss and degradation of natural habitats decreased. Goal 6: Control threats from invasive alien species. Targets: Pathways for major potential alien invasive species controlled; Management plans in place for major alien species that threaten ecosystems, habitats or species. Goal 7: Address challenges to biodiversity from climate change, and pollution. Targets: Maintain and enhance resilience of the components of biodiversity to adapt to climate change; Reduce pollution and its impacts on biodiversity. Goal 8: Maintain capacity of ecosystems to deliver goods and services and support livelihoods. Targets: Capacity of ecosystems to deliver goods and services maintained; Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained. Goal 9: Maintain socio-cultural diversity of indigenous and local	

communities.

Targets: Protect traditional knowledge, innovations and practices; Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit sharing.

Goal 10: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources.

Targets: All transfers of genetic resources are in line with the CBD, the International Treaty on Plant Genetic Resources for Food and Agriculture and other applicable agreements; Benefits arising from the commercial and other utilization of genetic resources shared with the countries providing such resources.

Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention.

Targets: New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20; Technology is transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.

Global Strategy for Plant Conservation (GSPC):

Target 1: A widely accessible working list of known plant species, as a step towards a complete world flora.

Target 2. A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels.

Target 3. Development of models with protocols for plant conservation and sustainable use, based on research and practical

experience.	
Target 4. At least 10% of each of the world's ecological regions effectively conserved.	
Target 5. Protection of 50% of the most important areas for plant diversity assured.	
Target 6. At least 30% of production lands managed consistent with the conservation of plant diversity.	
Target 7. 60% of the world's threatened species conserved In-situ.	
Target 8. 60% of threatened plant species in accessible Ex-situ collections, preferably in the country of origin, and 10% of them included in recovery and restoration programmes.	
Target 9. 70% of the genetic diversity of crops and other major socioeconomically valuable plant species conserved, and associated indigenous and local knowledge maintained.	
Target 10. Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems.	
Target 11. No species of wild flora endangered by international trade.	
Target 12. 30% of plant-based products derived from sources that are sustainably managed.	
Target 13. The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted.	
Target 14. The importance of plant diversity and the need for its conservation incorporated into communication, educational and	

public-awareness programmes. Target 15. The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this Strategy. Target 16. Networks for plant conservation activities established or strengthened at national, regional and international levels.	
Comments: Parties committed themselves to a more effective and coherent implementation of the three objectives of the Convention, to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth. This target was subsequently endorsed by the World Summit on Sustainable Development.	**Comments**: Effectiveness of the CBD depends on the actions of Parties and other institutions. There is a need to develop institutional links with other international bodies, and to develop cooperative relationships with such bodies. Complements other environmental legislation e.g. Habitats and Birds Directives, WSSD.

Relationship with Defra Natural Environment vision:

Does relate closely to the majority of the Defra Natural Environment Visions; particularly those relating to preserving biodiversity and halting loss of biodiversity in UK and abroad; sustainable management of ecosystems; integrating work across the natural environment; sustainable consumption and production; and increasing peoples understanding of the value of the natural environment.

Relevant Government strategies and actions: Biodiversity Strategy; BAPs

Policy	CITES – Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora.
	Current Regulations include Council Regulation (EC) No. 338/97 (Main Wildlife Trade Regulation), Commission Regulation (EC) No. 1808/2001 (Implementing Regulation) and Commission Regulation (EC) 252/2005 (Import suspensions)
Primary Theme or sector	Biodiversity
Related Themes or sectors	Transport
Type	Agreement
Policy origin	International Regulation (administered by UNEP).
Policy driver	Scientific evidence, political and consumer pressure
Policy owner	Defra Global Wildlife Division is the UK CITES Management Authority; JNCC and Royal Botanic Gardens Kew are Independent Scientific Authorities; Enforcement is carried out by HM Customs and Excise, Police and Defra Wildlife Inspectorate.

Description

CITES aims to protect certain plants and animals by regulating and monitoring their international trade to prevent it reaching unsustainable levels. The Convention came into force in 1975, and the UK became a Party in 1976. There are more than 150 Parties to the Convention. The CITES Secretariat is administered by the United Nations Environment Programme (UNEP). CITES regulates international trade in over 30,000 species, of which approximately 25,000 are plants. These species are listed in three appendices. Each Party must have a Management Authority responsible for ensuring that the Convention is properly implemented (including enforcement and issuing permits and certificates for import/ export/ commercial use of CITES specimens. Applications for CITES permits are referred to a designated CITES Scientific Authority for advice on the conservation status of the species concerned.

Monitoring and reporting: The monitoring of trade is to achieve the aims of the Convention. Scientific Authorities monitor export permits granted for Appendix II species and the export process; and advise their Management Authorities of suitable measures to limit the issue of export permits when required. Trade records form another important monitoring system. The annual reports of all Parties together should provide statistical information on the total volume of world trade in CITES species, which is vital for the assessment of their conservation status.

Targets*:*	**Expected outcomes**:
Overall target to reduce levels of wildlife crime. A Strategic Plan was produced to run up to 2005 which outlines the goals to achieve sustainable trade in wild flora and fauna. It confirms the recognition by the Parties that sustainable trade in wild fauna and flora can make a major contribution to securing the broader and not incompatible objectives of sustainable development and biodiversity conservation. It also recognizes that the Convention must continue to ensure that proper trade mechanisms are put in place. Seven goals have been identified as the key components of the Strategic Plan. Successful achievement of Goal 7, allied to Goal 5, will greatly enhance the achievement of Goals 1, 2, 3 and 4. Detailed objectives for each of the following goals can be found at http://www.cites.org/eng/news/English%20strategies.pdf Goal 1: Enhance the ability of each Party to implement the Convention. Goal 2: Strengthen the scientific basis of the decision-making processes. Goal 3: Contribute to the reduction and ultimate elimination of illegal trade in wild fauna and flora. Goal 4: Promote greater understanding of the Convention. Goal 5: Increase cooperation and conclude strategic alliances with international stakeholders. Goal 6: Progress toward full global membership. Goal 7: Provide the Convention with an improved and secure financial and administrative basis.	Wildlife management outcome Global Biodiversity outcome Reduction in need to use precautionary principle (where uncertainty remains as to whether trade is sustainable, this principle is used as a safeguard). Biennial reports contain information on implementation of the Convention, including progress in the development and application of laws and regulations, administrative procedures, economic and social incentives and wildlife trade policies. At the national level, biennial reports are used for self-assessment (Parties can identify achievements, significant developments or trends, gaps or problems and possible solutions). At the international level, the comparison and synthesis of information in biennial reports can support decision-making by the Conference of the Parties and various subsidiary bodies.

Comments:	**Comments**:
There are no specific time limits for the goals outlined in the Strategic Plan, though they are working towards fulfilling these by 2005.	The policy outcomes would complement those of the CBD in that they result in sustainable use of products.

Relationship with Defra Natural Environment vision:

Relates to Defra Natural Environment vision, particularly relating to preservation of biodiversity, environmental limits and sustainable use of resources.

Relevant Government strategies/ actions: Wildlife licensing; IUCN partnership.

Policy	Habitats Directive 92/43/EEC
Primary Theme or sector	Biodiversity
Related Themes or sectors	Water
Type	Legislation
Policy origin	EC
Policy driver	Scientific evidence, political/ consumer pressure.
Policy owner	Defra Global Wildlife Division/ European Wildlife Division

Description

The main aim of this Directive is to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements, this Directive makes a contribution to the general objective of sustainable development. The maintenance of such biodiversity may in certain cases require the maintenance, or indeed the encouragement, of human activities. In the European territory of the Member States, natural habitats are continuing to deteriorate and an increasing number of wild species are seriously threatened. As threatened habitats and species form part of the Community's natural heritage and the threats to them are often transboundary, it is necessary to take measures at Community level in order to conserve them.

In view of the threats to certain types of natural habitat and certain species, it is necessary to define them as having priority in order to favour the early implementation of measures to conserve them. In order to ensure the restoration or maintenance of natural habitats and species of Community interest at a favourable conservation status, it is necessary to designate special areas of conservation in order to create a coherent European ecological network according to a specified timetable. All the areas designated, including those classified now or in the future as special protection areas (Directive 79/409/EEC on the conservation of wild birds), will have to be incorporated into the European ecological network.

Targets*:*	**Expected outcomes***:*
• BAP Habitats and species specific targets	Wildlife management outcome

• Target condition of SSSIs (72% by April 2006; 83% by April 2008) • 95% nationally important wildlife sites by 2010 • Reverse long-term decline of farmland and woodland birds by 2020 • Reduce/ halt rate of biodiversity loss by 2010 The UK is required to: Monitor the conservation status of all habitats and species, including aquatic ecosystems; Endeavour to effectively manage landscape features of importance to wildlife within their land-use, planning and development plans; Implement a strict system of protection for listed species and the achievement of Favourable Conservation status for these species; Establish sites for natural habitats listed in Annex I and sites containing the habitats of the species listed in Annex II (Natura 2000 sites). The Natura 2000 network incorporates Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)	Global biodiversity outcome UK species and habitats part of a healthy functioning ecosystem on land, coast and sea The UK Government is fully committed to carrying out its legal obligations to implement the EC Habitats and Wild Birds Directives and, as part of that process, to contribute to the Natura 2000 network by designating Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).
Comments: Targets are timebound and scientifically based.	**Comments**: Complements CBD, Birds Directive, Bern and Bonn Conventions, WHC.

Relationship with Defra Natural Environment vision:

Relates to biodiversity, natural heritage, interaction with natural environment, and sustainable living landscape visions. Relevant Government strategies and actions: Biodiversity Strategy, Strategic species specific wildlife plans, BAPs, National Nature Reserves, SPAs, SAC, Natura 2000 and Ramsar designations.

Policy	Ramsar Convention
Primary Theme or sector	Biodiversity
Related Themes or sectors	Water
Type	Agreement (site-based)
Policy origin	Intergovernmental treaty (UNESCO acts as Depository; administered by Ramsar Bureau)
Policy driver	Scientific evidence
Policy owner	English Nature are responsible for Ramsar sites. UK Ramsar Committee represent the Government Departments of England and the devolved administrations for Scotland, Wales and Northern Ireland, countryside agencies and non-governmental organisations discuss Ramsar issues.

Description

 The Ramsar Convention is the Convention on Wetlands of International Importance especially as Waterfowl Habitat signed at Ramsar on 2nd February 1971, as amended by:

(a) the Paris Protocol (3rd December 1982)

(b) Regina Amendments adopted at the Extraordinary Conference of the Contracting Parties (28th May-3rd June 1987), and

(c) any further amendments coming into force from time to time.

The Ramsar Convention gives protection to wetlands of international importance. Ramsar sites have the same level of protection under UK law as European Special Areas of Conservation and Special Protection Areas, and all are already designated as SSSIs. The Convention aims to stem the progressive encroachment on, and loss of, wetlands. It provides a framework for national action and international co-operation for the conservation and wise use of wetlands and their resources, to contribute to achieving sustainable development throughout the world. As of 1 May 2003, the Convention has 136 Contracting Parties. More than 1280 wetlands have been designated for inclusion in the List of Wetlands of International

Importance, covering around 108.7 million hectares.

Targets*:*	**Expected outcomes**:
• Target condition of SSSIs (72% by April 2006; 83% by April 2008)	Wildlife management outcome
	Global biodiversity outcome
• 95% nationally important wildlife sites by 2010	
	UK species and habitats part of a healthy functioning ecosystem on land, coast and sea
The treaty includes four main commitments that the Contracting Parties have agreed to by joining.	
	Stem encroachment on habitats
1. Listed sites	
	UK has already listed 162 sites (over 805,000ha) and further sites are under consideration.
Designate at least one wetland for inclusion in the List of Wetlands of International Importance (the "Ramsar List") and promote its conservation, including, where appropriate, its wise use. Selection should be based on the wetland's significance in terms of ecology, botany, zoology, limnology, or hydrology.	
2. Wise use (ie sustainable use)	
General obligation for the Contracting Parties to include wetland conservation considerations in their national land-use planning, to promote wise use of wetlands.	
3. Reserves and training	
Establish nature reserves in wetlands, whether or not they are included in the Ramsar List, and promote training in the fields of wetland research, management and wardening.	
4. International cooperation	
Consult with other Contracting Parties about implementation of the Convention, especially in regard to transfrontier wetlands, shared	

water systems, and shared species.	
Comments:	**Comments**
Relationship with Defra Natural Environment vision: Relates particularly to biodiversity, soils functions, sustainable landscapes, replenished and restored ecosystems and environmental degradation. Relevant Government strategies and actions: Biodiversity Strategy, Strategic species specific wildlife plans, BAPs, National Nature Reserves, SPAs, SACs, and Natura 2000 designations.	

Policy	EU Landscape Convention
Primary Theme or sector	Landscape
Related Themes or sectors	Biodiversity, Forestry, Agriculture
Type	Agreement
Policy origin	EU
Policy driver	Political/ consumer pressure
Policy owner	Countryside Agency; Defra Countryside (Recreation and Landscape) Division

Description

The Convention was opened for signature in October 2000. It came into force (for all those who had ratified it) on 1 March 2004 - three months after it had been ratified by ten Council of Europe Member States. As of September 2005, 29 countries have signed the Convention and 17 have ratified it.

The aims of the convention are to promote European landscape protection, management and planning, and to organise European co-operation on landscape issues. This means ensuring the protection, management and planning of European landscapes through the adoption of national measures and the establishment of European co-operation between the Parties. It aims to formally recognise the importance of landscape in a whole territory, rather than a special area. It is the first international agreement specifically addressing landscape issues and will apply equally to urban, peri-urban and rural landscapes.

The convention applies to all parts of Europe and covers natural, rural, urban and peri-urban areas, whether terrestrial, aquatic (lakes and areas of brackish water) or marine (coastal waters and the territorial sea). It therefore applies not only to outstanding landscapes but also to everyday and damaged landscapes.

Signing the Convention would commit the UK to honour the obligations set out in the text. However, the Council of Europe has no legal powers over the UK and could not apply any set of international sanctions if the UK failed to meet its obligations. Council of Europe Conventions depend for their effectiveness on the compliance of the member states and domestic scrutiny.

Targets*:*	**Expected outcomes**:
Reduce/ halt rate of biodiversity loss by 2010	Landscape outcome

Reverse long-term decline of farmland and woodland birds by 2020	Land use outcome
95% nationally important wildlife sites by 2010	UK species and habitats part of a healthy functioning ecosystem on land, coast and sea
Create 15,000ha of new woodland from 2003-2005	
51,000ha hew woodland and 300,000ha approved management woodland between 1999 and 2006	
Each Party undertakes to:	
- recognise landscapes as an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity; - establish and implement landscape policies aimed at landscape protection, management and planning through the adoption of measures set out in Article 6;	
- establish procedures for the participation of the general public, local and regional authorities, and other parties with an interest in the definition and implementation of landscape policies; - integrate landscape into its regional and town planning policies and in its cultural, environmental, agricultural, social and economic policies, as well as in any other policies with possible direct or indirect impact on landscape.	
Comments:	**Comments**:
Some targets are timebound and scientifically based.	Other legal instruments do not deal directly, specifically and fully with European landscapes and their preservation. This convention is therefore distinct from the Unesco Convention concerning the Protection of the World Cultural and Natural Heritage of 16 November 1972. The Council of Europe convention can be regarded as complementary to the Unesco one.
	Other relevant Conventions include the Convention for the Protection of the Architectural Heritage of Europe, the Convention on the Conservation of European Wildlife and Natural Habitats and the European Convention on the Protection of the Archaeological

	Heritage. Complements other policies/ legislation such as Birds and Habitats Directive and CBD.

Relationship with Defra Natural Environment vision:

Relates directly to Defra Natural Environment vision, particularly sustainable landscape, replenished and restored ecosystems, sustainable management of ecosystems.

Relevant Government strategies and actions: National Parks and AONB Conservation Boards; Sustainable Farming and Food Strategy; England Forestry Strategy, Rural Strategy, ERDP land management measures.

Policy	1972 World Heritage Convention
Primary Theme or sector	Heritage
Related Themes or sectors	Biodiversity, Landscape, Archaeology
Type	Agreement
Policy origin	UNESCO (International treaty)
Policy driver	Scientific evidence, political/ consumer pressure
Policy owner	English Heritage/ English Nature

Description

Aims to define and conserve the world's cultural and natural heritage, by drawing up a list of sites whose outstanding values should be preserved for humanity and to ensure their protection through closer co-operation among nations. "Cultural heritage" includes monuments, groups of buildings or sites of historical, aesthetic, archaeological, scientific, ethnological or anthropological value. "Natural heritage" includes outstanding physical, biological and geological features; habitats of threatened plants or animal species and areas of value on scientific or aesthetic grounds or from the point of view of conservation. Adopted by UNESCO in 1972.

A key benefit of ratification, particularly for developing countries, is access to the World Heritage Fund. Annually, about US$4 million is made available to assist States Parties in identifying, preserving and promoting World Heritage sites. Emergency assistance may also be made available for urgent action to repair damage caused by human-made or natural disasters. In the case of sites included on the List of World Heritage in Danger, the attention and the funds of both the national and the international community are focused on the conservation needs of these particularly threatened sites.

Targets*:*	**Expected outcomes**:
Adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes; Set up one or more services for the protection, conservation and	UK species and habitats part of a healthy functioning ecosystem on land, coast and sea Inscription on the World Heritage List raises awareness about heritage. Heightened awareness, in turn, leads to greater

presentation of the cultural and natural heritage;	consideration and a general rise in the level of protection and conservation afforded to heritage sites. Regular reporting on the state of conservation of inscribed sites ensures the upkeep of their outstanding qualities.
Develop scientific and technical studies and research;	
Take appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage;	
Foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field.	
States Parties must report regularly to the World Heritage Committee on the state of conservation of their World Heritage properties.	
The Convention also encourages States Parties to strengthen the appreciation of the public for World Heritage properties and to enhance their protection through educational and information programmes.	
Comments: No specific timebound targets	**Comments**:
Relationship with Defra Natural Environment vision: Relates to biodiversity, natural heritage, interaction with natural environment, and sustainable living landscape visions.	

Appendix 2: Regional Delivery – Case Study

Much of Defra's policy has to be delivered at the regional level by organisations like the local authorities or through the regional offices of the key delivery agencies. We met with Alison Hepworth, a Policy Advisor (Environment) of the East Midlands Regional Assembly (EMRA) to discuss issues concerning the delivery of government policy with respect to the protection of natural resources. EMRA is a voluntary regional partnership made up of 111 members, nominated from 45 local authorities, the Peak National Park Authority and members from the wider social environmental and business communities including MEPs. EMRA works closely with Government Office for the East Midlands (GOEM), the East Midlands Development Agency (EMDA) and the East Midlands Regional Local Government Association (EMRLGA).

The Integrated Regional Strategy (IRS) represents the Sustainable Development Framework for the East Midlands Regional Assembly (EMRA)[56]. The IRS Framework ensures that policies and strategies are not prepared in isolation but in a compatible and integrated way. Components of the IRS include:

- The Regional Economic Strategy

- Regional Spatial Strategy

- Regional Environment Strategy

- Social Strategies

    - Investment in Health,

    - Housing

    - Time for Culture

Each strategic component has been developed within the framework of the IRS and together is intended to help the region move towards its vision, objectives and priorities. The IRS describes and facilitates integrated delivery through partnerships at the regional, sub-regional and local levels. Achievement requires all those involved in implementing the programmes, initiatives and projects to work towards a shared vision.

EMRA's Vision

'The East Midlands will be recognised as a region with a high quality of life and sustainable communities that thrives because of its vibrant economy, rich cultural and environmental diversity and the way it creatively addresses social inequalities, manages its resources and contributes to a safer, more inclusive society'.

The five priorities for the region are:

1. Reduce inequalities in the region

2. Conserve and enhance the natural environment

3. Create sustainable and healthy communities throughout the region

4. Improve economic performance and competitiveness

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[56] England's East Midlands Integrated Regional Strategy – our Sustainable Development Framework, January 2005. East Midlands Regional Assembly

5. Use natural resources more efficiently and reduce the impacts of climate change

Seventeen sustainable development objectives are described by overarching social, environmental, economic and spatial themes.

Environment Strategy

All components of the IRS have a lead organisation and the Regional Environment Strategy (RES)[57] was published by the Environment Task Group of EMRA in 2003 and its action plan in 2004. The RES is available at www.actions4environment.org.uk. The RES recognises and understands the national policy context as the basis for its development e.g. The Biodiversity Strategy, Defra's Public Service Agreements, the Strategy for Sustainable Farming and Food, the Environment Agency's vision for Water Resources Strategy and relevant Planning Policy Guidance documents.

A key challenge is to ensure that environmental infrastructure is integrated into the built environment as part of the overall sustainability objectives. The environment provides the framework for the sustainable use of environmental resources, waste management, sustainable travel, design and construction and the built environment. The environment also provides the green infrastructure – the network of protected sites, assets and ecologically functional landscapes and linkages eg river corridors, migration routes, landscape features etc.

The Environment Task Group identified 5 key components of the RES:

- People and heritage

- Air

- Land and land use

- Water

- Natural Heritage

Twenty-two 'areas4action' were identified and regional action plans developed and agreed with input from a range of key partners groups and individuals in the region. The plans provide a mechanism for securing agreement with partners and provide a clear basis for action. Indicators and targets have been agreed to monitor progress and communicate success. A simple traffic light approach to target achievement is used categorised by 'significant change toward', 'no change' and 'significant change away'.

Environment Strategy (Policy Env10) on soil resource protection.

EMRA is aware of Defra's Soils Action Plan[58] and that the EA are shortly to publish a soils strategy. It is also acknowledged that other nationally led activity, such as the Entry Level Scheme, the introduction of soil management measures as part of Cross Compliance for the Single Payment Scheme, support for the preparation of farm nutrient management plans and the development of wider, sustainable catchment and floodplain management schemes are all having a beneficial impact. However it is also recognised that there is less understanding and awareness of soils than of other regional issues such as air and water, and that the strategic 'big picture' of trends and issues at a regional scale is incomplete.

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[57] An Environmental Strategy for the East Midlands, Actions4Environment, East Midlands Regional Assembly, 2003.
[58] First Soil Action Plan for England, Defra, London. 2004.

In 2006 the Environment Group and its advisory group recognised the need for better information on the extent and nature of the soil resources in the region, such that forward planning of the environmental strategy and action plan might take into account the multi-functional capacity of these soils. A project jointly funded by EMRA, Defra's Natural Resources and Rural Affairs, Soils Division, the Environment Agency and The National Trust have commissioned a review to provide a thorough knowledge and understanding of these soil resources to enable more effective monitoring of their function as part of the sustainable land use policy reflected in the Environment Strategy. A secondary aim of the project is to raise the awareness of the many functions that soils carry out in providing environmental services within the region, and importantly how they interact with air and water, where environmental impacts are more readily recognised and appreciated, for example, the interaction between soil and land management and the flow mediation of rainfall and run-off from the land to waterways, will be examined in detail.

The need for such an overview is made all the more important in the context of understanding and managing the impacts of climate change, such as more frequent or extreme weather events and sea level rise. Large areas of upland Derbyshire, for example, are classified as being at 'greatest risk' of soil erosion by water and 17% of the land area of the region is at risk from flooding. In the Fens, most of the region's grade 1 farm land lies below the 5 meter contour and is at risk from inundation and salt water contamination by rising sea levels.

This is a technically complex area in which a range of factors is inter-acting to drive change. Some of these are adverse but others may offer positive opportunities. EMRA wishes to understand these drivers and trends better, so that it can identify the priorities for action, where this is needed. It is also intended that this work be used to inform regional policy and delivery in a number of key areas. These include the current review of the Regional Spatial Strategy (RSS) and the development of the Regional Rural Development Framework (RRDF) which will inform the forthcoming development of the England programme for the European Agricultural Fund for Rural Development (EAFRD). It may also help to inform the geographical focus of project working in Natural England to deliver biodiversity, landscape and sustainable land use benefits at a landscape scale.

Key issues

The environment policy officer in EMRA has good working relationships with the local delivery agencies, EA, EN. There is a Memorandum of Understanding with the Defra family that includes CA, CA, EA, EN, FC but these agreements are generally managed at a senior level. EMRA also works with organisations like English Heritage and the National Trust. It is anticipated that the creation of Natural England will increase liaison with organisations like RDS. No one person in the Government Office has responsibility specifically for the environment. It is considered that there are generally good agreements with partner organisations but management is cumbersome with large steering committees and groups, many ideas but no dedicated budgets – EMRA considers itself lucky to have so many committed individuals to help at regional level. There is also evidence of cross regional collaboration e.g. EMRA works with the West Midland Regional Assembly concerning the management and development of the National Forest.

EMRA is not included in many of the Defra consultations and did not see anything connected with the NRP Vision. When consultations have been responded to EMRA would like feedback– do comments make a difference? It was considered a good idea if Defra could hold a regional assembly liaison meeting to share issues annually.

The main gaps that EMRA perceives impact on natural resource protection are:

- Soils information: this is being addressed through a recent project

- No biodiversity co-ordinator in EMRA

- Further work could be developed on the importance and role of green infrastructure

- Environmental capacity a Strategic Environment Assessment approach is required to identify the balance of needs. EMRA cited the recent DCLG Planning Policy Statement 25 Development and Flood Risk consultation (closed February 2006) which aims to ensure that flood risk is properly taken into account in the planning of new developments. The document does not include any reference to soil, erosion and the subsequent impacts on ecosystem services yet soil, its properties and its management could be critical in the management of flooding.

Appendix 3: Promoting Ecosystems policy

Promoting Ecosystems Policy

Morris, J., Angus, A., Cook, M., Harris J., White, S.
Institute of Water and Environment, Cranfield University

1   Introduction, Context and Purpose

Environmental policy has largely been remedial and reactive in approach. Growing awareness of continued pressure on resources that threaten ability to sustain existing levels of material consumption, combined with increasing recognition of effect of environmental quality on human welfare questions whether the existing policy frame is capable of delivering development goals.

There is an emerging groundswell of opinion that unless protection of the natural environment and the benefits that it provides are set as clear policy objectives and given primacy as measures of social wellbeing, environmental policy will continue to be reactionary, remedial, fragmented, and unpopular amongst those who are regulated by it. Furthermore, unless the importance and value of ecosystems is explicitly recognised by decision makers and built into ways of managing natural resources and overall governance (and planning) frameworks, there will continue to be friction between those who promote the concept of ecosystems and those who, while sympathetic to the concept, are locked into a policy framework that cannot accommodate it.

This chapter reviews the current policy regime for environmental regulation within the broad framework of sustainable development, using the Drivers-Pressures-State-Impact Response (DPSIR) framework. It considers the concept of ecosystem services as they underpin social well being and the extent to which they are explicitly recognised and valued in existing policy regimes. Much of environmental policy redresses the actual or potential damage arising from activities by individuals, organisations and government. In this respect, attention is drawn to challenges associated with externalities, public goods and ill-defined property rights:

The discussion moves on to explore contemporary issues at the heart of sustainable development: i.e. the need:

- to redefine measures of development and social well-being,
- to better understand the two way relationship between ecosystems service and well being,
- to encourage voluntary collective action that reduces environmental burdens and risk in the common interest.
- to determine how best, through a range of policy measures, to embed ecosystems thinking into decision making at all levels so that policy shapes patterns of production and consumption rather than mainly compensating for their effects.

2   The Existing Policy Framework.

The UK, given its industrial heritage, has a relatively long history of 'controlling' and 'governing' the side-effects of economic activities that have potential to cause damage to people, their health and property. These 'external' impacts, so called

because they arise due to the activity of one party and are borne as a cost by a third party without compensation or redress, can result in the contamination of land, water and air and the destruction of living systems. Because people affected are made worse off as a result, total welfare, that is the public good, declines. Hence the justification to regulate the behaviour of one party to protect the interests of another: restricting personal freedoms in order to serve the public good: environmental quality being a key determinant of public good.

Early regulation in Britain, including for example the Municipal Water Acts (1860s), the Alkali Act (1874), and Clean Air Act (1956) adopted a reactive policy framework, controlling the worst excesses of industrial processes. This policy approach tended to focus on particular issues, such as air or water quality, addressing challenges as they arose. Regulatory regimes extended into land development (Town and Country Planning Act 1947, National Parks and Access to the Countryside Act, 1949) and into nature conservation (1981 Countryside and Wild Life Act). This selective approach continued through to the 1990 Environmental Protection Act (EPA) that, amongst other things, attempted to integrate previously fragmented and sometimes conflicting regulatory regimes. This Act heralded a new approach to environmental regulation combining a holistic multi-media approach across with a precautionary, proactive style to regulation.

Since the early 1990s, most environmental regulation has been delivered through European legislation in the form of Directives to be enacted by Member States. Although initially focussing on individual key environmental concerns, such as nitrate pollution of water and habitat loss, mimicking aspects of the 1990 EPA. Recent interventions have adopted a more integrated approach. The Integrated Pollution Prevention and Control Directive (IPPC) and the Water Framework Directive (WFD) are examples of such. These regulations will 'capture' some industries and processes that have not been previously regulated, such as IPPC regulation of large pig and poultry units.

The last 15 years have witnessed considerable expansion in environmental regulatory regimes, reflecting greater knowledge and concern about potential damaging environmental effects. This has placed an increasing administrative burden on the regulator and the regulated such that both parties are seeking ways to achieve 'modern regulation' (EA, 2005) that is effective and efficient, developing regulation methods that are fit for purpose and proportionate to the risks involved.

> The current EU environmental policy framework meets continuing criticism for being reactive towards environmental issues as they arise, addressing resource and pollution issues separately, and failing to adopt a sufficiently forward looking "precautionary" approach (Angus *et al.*, 2003). This also holds true when it comes to developing abatement policies, resulting in failure to deal with important aspects of synergy and conflict between mitigation measures (Erisman *et al.*, 2003). There has been a gradual shift to addressing causes of environmental degradation rather than effects. Success in policy has largely been confined to resolving problems that can be handled, 'mainly by additive technical standard solutions, without restricting markets or relevant societal routines' (Janicke, 1997).

> **Box 1: Policy and Restoration – up to a Point**
>
> Although many policy interventions are remedial, it is difficult to re-instate ecological capacity to a condition prior to legislation being enacted, other than when "harm" can be demonstrated in its narrow sense as applied to pollution. For example, there are no mechanisms for employing ecological restoration to re-instate natural capital lost as a result of agricultural intensification over the past fifty years: efforts in the public sector have focussed on conservation. The IPPC regulation requires sites on decommissioning to be no worse, but no better, than at the time of first permitting.

The main approach to regulation can be described using the DPSIR, now widely used by developmental and regulatory bodies such as the European Environment Agency, the Organisation for Economic Cooperation and Development, Environment Agency, and Defra (EEA, 1999). Originally, the framework comprised pressure-state-response, but was subsequently extended to include drivers and impacts: the latter because it is risks to people and living systems that is of main (political) concern and that which justifies policy intervention; the former in recognition that it is broad societal motivation and systems of governance that generate pressures associated with human activity, with consequences for the 'state' of the environment.

The DPSIR framework is useful because it systematically considers the relations between environmental and human systems. By using 'objectively verifiable indicators' for each component, the framework can provide an auditing tool to monitor change over time.

The framework is useful because it can help to identify cause and effect relationships, allowing for the separation of resource allocation issues through the different DPSIR categories, which are defined as:

- driving-forces, which are the socio-economic causes underlying environmental pressures, for instance these driving forces could be urbanisation or industrial demand for natural resources; pressures, are activities that affect the state of the environment, such as polluting emissions to the atmosphere or water abstraction;
- state, is the condition of the environment in terms of the quality and quantity of natural resources;
- impact, is the effect that a change in the state of the environment has on human health, welfare and biodiversity;
- response, is a management option such as, law, programmes and research that target one or more points in the environmental change process in order to mitigate damage/problems, or re-orientate drivers/pressures.

Figure 1 provides an overview of the DPSIR Framework.
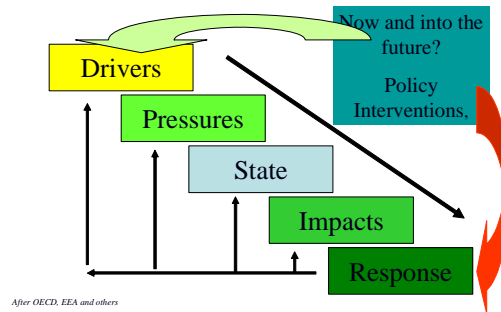
After OECD, EEA and others

Figure 1: The Drivers-Pressures-State-Impact-Response Framework

The DPSIR framework provides a structure for policy design with responses targeting the various elements of D, P, S and I. Figures 2 and 3 provide examples for UK agriculture. High level drivers, including the production oriented Common Agricultural Policy, have promoted intensive farming leading to a deterioration in the state of the rural environment, with consequences for people and wildlife. Responses have taken a number of forms: either attempting to 'modify' drivers, 'alleviate' pressures, 'protect' states and 'mitigate' impacts.
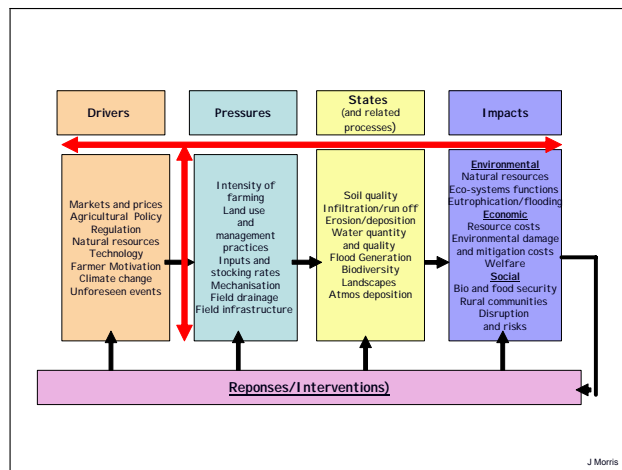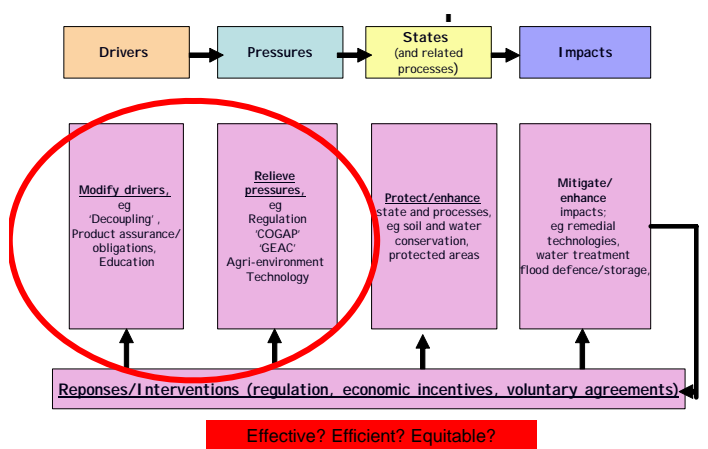

Figure 2: DPSIR Policy Framework for UK Agriculture

Figure 3: DPSI and Responses for UK Agriculture

The DPSIR framework demonstrates a policy continuum, from modification (mainly proactive, preventative and enhancing) through to mitigation (mainly reactive, curative and protective). It also confirms that most regulatory measures have been predominantly reactive and remedial. These are likely to be less effective and efficient in the long term than those that address key drivers, because they do not address the origins of the regulatory problem. They are also likely to need constant revision in the face of changing drivers and the avoidance strategies of regulated parties. By comparison, policies that address high level drivers such as patterns of consumption, although likely to be more effective and efficient in the long term, require fundamental changes in social motivation and governance systems. These go well beyond the environmental brief. This has two implications for environmental policy: (i) in the absence of a paradigm shift in societal motives, environmental policy is always likely to be reactive to the negative effects of development policy, and (ii) proactive environmental protection can only be achieved if environmental objectives are built into key areas of macroeconomic policy, such as transport, energy, agriculture, and trade.

Responses include choice of policy instrument: whether mandatory regulation, voluntary agreement, economic instruments, or other actions such as advice or research and technological development. Criteria for choosing instruments include effectiveness, incentive for continual improvement, efficiency, fairness, administrative feasibility and acceptability to dominant interests groups. But it is difficult to generalise which instrument will be most appropriate without reference to, for example, the characteristics of the polluting activity or substance (e.g. potential toxicity, physical form), its source (point or diffuse), and the type and sensitivity of the receptor (e.g. water, actual toxicity). The general approach to diffuse pollution from agrochemicals, for example, has been to promote codes of good agricultural practice rather than impose mandatory regulations that are difficult to enforce. Where there is a strong link between a practice and damage to a sensitive receptor, however, a regulatory framework has been adopted. Examples include the Nitrates Directive that limits application of N fertiliser in N sensitive areas and the IPPC Directive that

requires pig farmers above a given threshold to cover slurry lagoons to limit ammonia emissions to atmosphere.

It is a tautology to say that policies are interventionist. But policies are applied in order to change what otherwise would be the case, into a preferred outcome. This reflects the widely held view that unfettered economic activity is unlikely to optimise social welfare: that aggregate private benefit and social benefit will not converge, and some redistribution of entitlement is valid on welfare grounds. Environmental policies, for the most part correct, as discussed later, for the failure by private individuals to include environmental effects in their decision making (market failure), or by governments as they implement non-environmental policies (such as housing development and employment creation). This is apparent in the DPSIR framework: most interventions are remedial.

The most effective and efficient policy approach is to obtain a condition where Drivers in the DPSI(R) framework explicitly incorporate environmental objectives and, as a result, regulation at other stages is less required. This can be achieved by two main methods:

(i)   ensuring that the costs (and benefits) of environmental effects of human activities are explicitly and directly included in all decisions – the notion of internalising externalities, in this way 'polluters pay' for damage and 'providers are paid' for enhancements.

(ii)   building in environmental quality and ecosystems thinking into the social psyche and systems of governance such that regulatory environmental policies become redundant.

The first method uses a remedial approach: correcting for institutional failures. The second requires a fundamental, paradigm switch in social motivation and routines that explicitly put ecosystems at the centre of definitions of social well being.

This changes at source in the Drivers of the DPSIR framework, reduces the reliance on a regulatory framework. For it to work, the overall environmental effect (footprint) must reduce. This will require people acting individually or collectively to reduce consumption. In the neo-classical economics 'empty world model', reduced consumption, evident in a fall in GDP at national level, implies reduced welfare. In the ecological economics 'full world model', however, welfare includes the benefits of ecosystem services (as discussed below) that are unrecorded, unpriced and unvalued in the conventional measures of national income. People may reduce consumption of marketed goods in the conventional sense but possibly enjoy higher levels of untraded ecosystem services: hence reduced consumption does not mean lower welfare. It is apparent that as ecosystems services become scarcer there is a need to include their value in definitions of social well being and 'development'.

A major challenge is to do the same or more, with less. Technology, in its widest sense, is perceived to have an important role here. Rather than seeing it as a 'remedial fix', however, it can be perceived promoter of beneficial change, as, for example, with integrated crop management for sustainable agriculture or eco-housing design. There is a clear role here for policy to support research and

development. The development of plant and crop genetics to reduce environmental load is an example.

Evidence to date suggests however that there are major barriers to such a proactive approach given the emphasis on economic development. Furthermore proactive approaches are more likely to challenge existing dominant interests, and although they may offer greater benefits in the longer term, these are uncertain and are likely to be more widely dispersed. Thus proactive approaches may encroach on established interests and meet with resistance as a result.

That there is bias against a proactive approach is evident in state failure, industry resistance, and the tendency to remove difficult decisions from the policy agenda. In this context decision making adopts a 'bounded rationality', seeking a satisfactory outcome, rather than an optimal one. To expect anymore might be too much. For the most part, an incremental approach is adopted, and though giving the impression of 'muddling through', can reduce the costs and risk of policy reform. It can effect changes reasonably quickly, more so than calls for radical policy change that 'rock the boat' or disengage those who need to be 'on board' (Lindblom, 1979; Gouldson and Murphy, 1998). Most stable political systems appear to work in this way.

Box 2 DPSIR: Relieving One Pressure May Lead to another

The phase out of Chlorofluorocarbons (CFCs) has been achieved by replacing it with hydroflurocarbons (HFC), perflurocarbons (PFC) and Sulfur Hexafluoride (SF_6), all of which are potent greenhouse gases. Such trade-offs would not present a problem to decision-makers if the relative costs of each separate pollutant could be compared; decision-makers could then prioritise abatement according to which pollutant caused the greatest harm to society. However, often such costs are incommensurable or not easily quantifiable. Predicting the consequences of policy responses which target particular pollutants is difficult without understanding the dynamics of stakeholder responses.

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3   An Alternative policy Framework: Ecosystem Services

3.1   Ecosystem Functions and Services

From an anthropogenic viewpoint, the concept of 'ecosystem functions' represents the capacity of natural processes (methods of continuous operation) to provide goods and services (items that confer benefit and advantage) to meet human needs, directly or indirectly (de Groot 2002).

The concept of ecosystem services has gained much currency following its adoption by the recent Millenium Ecosystem Assessment (MA, 2005) to represent the flow benefits to society arising from stocks of renewable natural resources and related ecosystems (Figure 4). The notion of the environment comprising a stock of natural capital or assets, which infer wealth and provide flows of benefits over time to those who control them, is similar to that used in financial accounting. The stock of assets must be maintained and not degraded if the flow of services and the benefits obtained are not to decline. Economic activity, aided by new technologies, has extended beyond the boundaries of natural capital by substituting man made capital in various forms, for example by replacing inherent soil fertility with artificial fertilisers.

There are limits to this form of growth, especially when man made substitutes lead to further deterioration in the stock of natural assets (Meadows *et al.*, 1972).
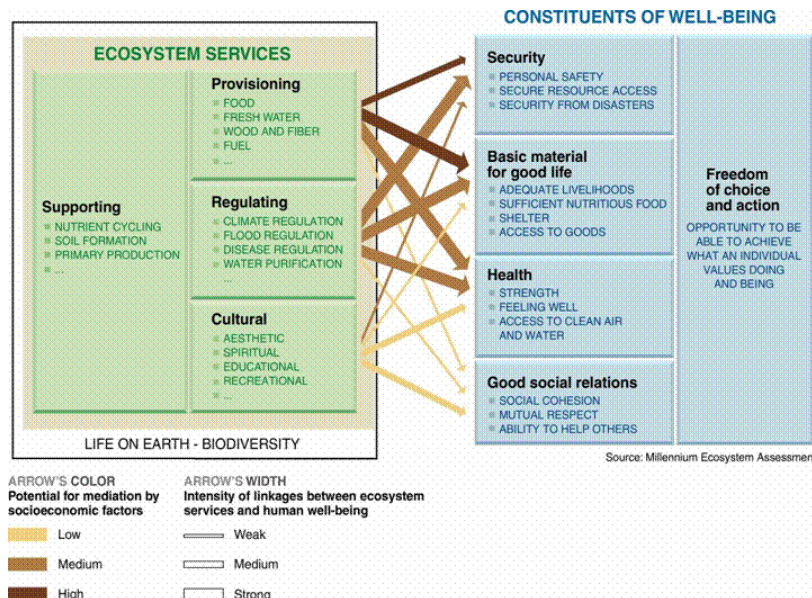

Figure 4: Ecosystem Services and Social Well Being (source: Millennium Ecosystem Assessment)

Various terms are used, sometimes interchangeably, to represent the link between the workings of ecosystems and benefits to people. The term function is used to represent the way natural systems work under normal conditions, namely:

- *Production functions* – the capacity to provide resources i.e. water, food, raw materials, energy (production is linked to consumption functions).

- *Regulation functions* – the capacity to regulate essential ecological processes and life support systems i.e. regulating climatic, water, soil, nutrients, ecological and genetic conditions.

- *Carrier functions* – the capacity to provide space and location for activities and processes i.e. habitation, cultivation, energy generation, conservation, recreation.

- *Habitat functions* – Provision of unique refuges and nurseries for plants and animals, helping with the conservation of genetic, species and ecosystem diversity (habitats are sometimes treated as part of carrier function).

- *Information functions* – the capacity to contribute to human well being through knowledge and experience and sense of relationship with context e.g. spiritual experiences, aesthetic pleasure, cognition and recreation.

Table 1 contains examples of the link between functions, processes and services. Ecologists argue that such functions have an existence beyond their human

interpretation, and humans would be silly to ignore this because to do so puts their own future at risk (Farber *et al.*, 2002).

Table 1: Examples of Ecosystem Functions, Processes, Goods and Services

Functions	Example	Process	Goods and Services
Production	Food	Photosynthesis conversion to edible matter	Food for consumption
Regulation	Water regulation	Hydrological processes involving water conveyance and storage	Drainage and flood management, water for consumption
Habitat	Nursery function	Habitat supporting reproduction	Harvested foods e.g. fisheries
Carrier	Transport	Navigation	Movement of goods
Information	Recreation	Landscape development	Amenity, enjoyment of countryside

Depending on circumstances, functions and services may be complementary or competitive. For example, the hydrological function of floodplain storage may not be compatible with the production function of intensive agriculture.

Ecosystem services provide value by conferring benefits and advantage to those who use them (and to those who derive benefit solely from the knowledge they exist). This can be conceptualised by the Functions-Uses-Value (F-U-V) framework, which is illustrated below in Figure 5.
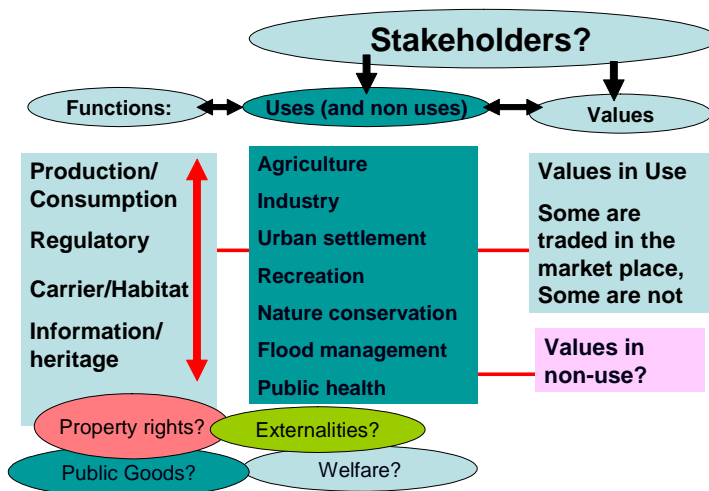
Figure 5: Functions, Uses and Values

3.2   Uses

A use can be defined as *the act or practice of employing something* for a purpose. Uses are supported by functions, processes and related services. Wetlands for example provide for direct use through goods and services such as fish (production) and hydrological controls (regulation) that attenuate flooding. They also provide habitat (wildlife) and information (landscape) functions.

These uses are by definition purposeful. Uses may be categorised into major types of human activity, e.g. agriculture, fisheries, recreation and amenity, conservation, flood storage.   As with functions and services, uses may be compatible or competitive.

3.3   Values

Value is used here to mean instrumental value of ecosystems; that is the beneficial effect of an entity on another entity. Value is reflective of usefulness in terms of fitness for purpose, and is usually associated with the concepts of scarcity and opportunity cost. Economists' tend to express value in terms of equivalent value of consumption (expressed in terms of income) and hence willingness to pay to obtain a benefit (Teitenberg, 2003). Alternatively, value can be measured in terms of the cost of providing the service by some other means (Turner *et al.*, 2001).

Values imply some 'stakeholder' interest here by an individual, group, organisation, society expresses a view about relative or absolute value (see below).

Market prices of goods and services are the most commonly used measure for comparison and exchange, and provide signals of resource scarcity (Costanza *et al.*, 1989; Clarke and Joosten 2002; Brauer, 2003). Markets are most effective where there are large numbers of buyers and sellers and there are clear, enforceable and transferable property rights. Under these circumstances prices direct the allocation of scarce resources to their most efficient use, thereby maximising overall societal welfare (Costanza *et al.*, 1989; Hanley *et al.*, 2001; Tietenberg, 2003).

Unfortunately however, these conditions do not apply to all ecosystem functions, especially those generating indirect user values that are not traded in the market place (such as the flood management contribution of wetlands) and those associated with 'non-use' benefits (such as for example in the case of the Cambridgeshire fens, the option, existence, bequest, and altruistic values of conserved peat soils and related habitats). In particular these ecosystem functions and benefits are not captured within the dominant system of entitlements and property rights that define market transactions and hence values. Loss of ecosystem functions often manifest themselves as external costs, lying outside the property rights that are the subject of a transaction. This represents a failure of the market system and poses a major challenge for policy makers.

Nevertheless, significant progress has been made on the valuation and inclusion of ecosystems functions in decision making, but estimates need to be treated with caution (Brouwer *et al.*, 1999) and regarded as indicators of relative value rather than absolute value (Garrod and Willis 1999; Turner *et al.*, 2003).

Box 3: Total Economic Value for Environmental Services

The concept of Total Economic Value (TEV) (Common, 1996; Perman *at al.*, 1999) provides a valuation framework to capture the range of economic value provided by ecosystem goods and services. TEV can be represented as:

$$TEV = UV + EV + OV + QOV$$

Where:

UV = User Value, arising from direct or indirect use of a good or service.

EV = Existence Value, arises from a knowledge that a good or service exists; this is independent of actual or prospective use and also includes Bequest Value and Altruistic Value. Bequest Value, relates to the value from knowing a good or service will be passed on to future generations. Altruistic Value relates to the knowledge that contemporaries can gain value from ecosystem goods and services.

OV = Option Value, relates to the value derived from ensuring a good or service remains available for future use or non-use.

QOV = Quasi Option Value, relates to the value derived from avoiding an irreversible commitment to the use of good or service, given the expectation that the goods and services may provide more value in the future.

3.4   Stakeholder Interests

Stakeholders are a key element of the F-U-V framework. These are individuals, groups or organisations with an interest in a given activity or area, further distinguished according to the degree to which they can influence the phenomenon of concern; their interest or usage of an area may or may not be compatible. Balancing the requirements of all stakeholders whilst, where possible, maintaining the integrity of ecosystem functions is a difficult task that requires a sound understanding of existing social, economic and environmental interactions (Ravnborg and Westermann 2002).

Stakeholder consultation and participation are key elements of developing environmental policy. For a given 'environmental entity', or change therein, this involves, amongst other things, deriving an understanding of the variety of objectives, degrees of influence and entitlement, perceptions of value, decision making and coping strategies, stakeholder interactions, vulnerability, and the perceived suitability of alternative 'responses' in pursuit of sustainable management of natural resources. Usually engaging these varied interest requires a participatory approach, although for contentious issues it may not be possible to reconcile all interests. For example, the River Parrett Consortium in Somerset has brought together a wide range of stakeholders in an attempt to derive a consensus for beneficial change on the Somerset Levels and Moors (Wise Use of Floodplains 2002).

As demonstrated, the F-U-V framework can help understand the link between environment, values to people and hence social wellbeing. By deriving estimates of TEV, it can help to make informed judgements about the relative value of economic development and ecological preservation (Eftec, 2005). However, it must be remembered that economic values reflect, and re-enforce prevailing patterns of

influence, wealth and income. A change in these would bring about a change in social values.

The F-U-V framework can help develop an understanding and appreciation of environmental quality by focussing on uses and values, making the link into the underlying functions, processes and services that are not readily apparent, overlooked and taken for granted: until that is they are lost or severely damaged .

4   Viewing Ecosystem Services from an Institutional Economics Perspective

Research on ecosystem services has tended to focus on quantification, and to a lesser extent valuation, of service provision in order to inform management. Relatively little attention has been paid to the institutional arrangements that govern the interaction between ecosystems and society.

However, to date, environmental valuation has not been fully integrated into decision making, such as for example the ward or refusal of planning consent for housing development. Indeed decision-makers appear reluctant to rely on environmental valuation as a basis for regulation. Moreover, social preferences, although revealed in market behaviour, are embedded and learned within an existing social structure and tend to be resistant to change. Therefore, unsustainable exploitation of ecosystem services and the motivations behind them are related to the property relations and the rules and norms that give them authority (Adger and Luttrell, 2000).

Given the perceived lack of reliability of environmental valuation, this puts extra emphasis on defining a regulation structure that will sustain the supply of ecosystem services (Baarsma and Lambooy, 2005).

Achieving an optimal regulation structure falls under the remit of institutional economics. According to this body of economic theory, economic processes cannot be explained solely by markets and prices, since market processes are themselves underpinned by an institutional structure that defines rights, duties, obligations and opportunities and the ways in which people and organisations behave, interact and go about their business.

Institutions are the humanly devised processes that shape human interaction. They enable individuals to do what they cannot do alone, structuring incentives and facilitating advantage. They take the form of formal legal rules, such as law, administrative regulations and court decisions, or informal norms and conventions such as customs and social routines. Institutions are consciously shaped by those with influence (but also as a means of seeking to create influence) in order to consolidate or establish a position and take advantage of changing circumstances. In a market context they are used to exploit new opportunities, to capture benefit streams or to reduce transactions costs (North, 1990; Schmid, 2004).

Williamson (2000) identified four levels of institutional analysis: cultural values; formal institutions; contract relations; market interactions (Figure 6). These levels reflect the relative stability of rules and behaviour. For example, while market interactions almost continually change, cultural change occurs at a 'glacial' pace (Giddens, 1990).
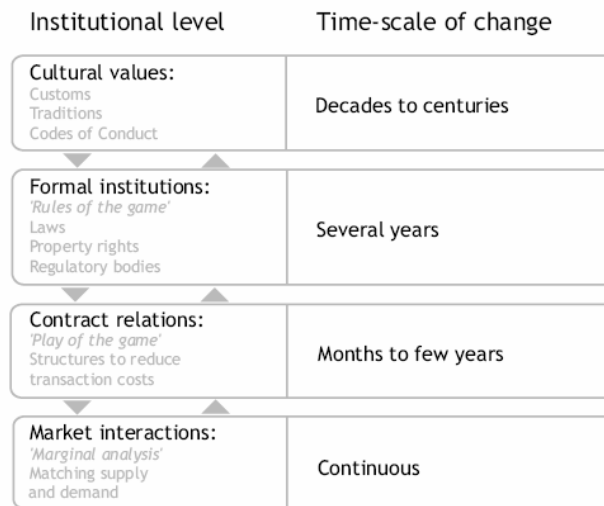
Figure 6: Levels of Institutional analysis (source: Willaimson, 2000)

In the current context, institutions simultaneously reflect and shape the relationship between society and ecosystems. This is evident in the UK in environmental legislation that has moved regulation from common law of tort and nuisance to statutory law enacted by Parliament, as is the case with noise pollution.

As the relationship between society and ecosystems is changing, to a large extent because of the impacts of previous human activities, these institutional arrangements need to be kept under continuous review. Carpenter and Folke (2006) refer to this as 'adaptive governance', involving for example realignment of property rights (permitting systems) and integration of institutions that operate at different scales (e.g. catchment flood management plans, WFD river basins). Given the uncertain response of ecosystems to human interventions Carpenter and Folke promote the notion of adaptive management, arguing that management actions should be viewed as experiments that can improve knowledge of social-ecological dynamics. The outputs of these closely monitored and analysed experiments, inform future management. In this respect ecological knowledge is essential to support adaptive governance. However, this requires scientists to be fully integrated within governance systems, rather than as is often the case, working independently and using research outputs to challenge policy makers who are working within separate established frameworks (Carpenter and Folke, 2006).

Box 4 explores a case study of how institutions can be used to create property rights for ecosystem services

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Box 4: Tradable Pollution Permits for Protecting Ecosystem Services

Tradable pollution permits work by creating a new property right that entitles the holder to release one unit of pollution, or if they wish, to sell their property right to another firm. Thus, the polluter must be allocated or purchase one unit of the environment's adsorptive capacity before using it. The price of the permit is determined by the permit market, which places a monetary value on the adsorptive capacity of the environment; in this way the value of these ecosystem services are captured within the market system.

The success of a tradable permit scheme is partially dependent on the level of regulatory control and hence the institutional arrangements for market operation. Aside from defining the pollution reduction target, a regulatory agency is required to maintain the credibility of a trading scheme, by for example monitoring pollution levels, compliance levels, and documenting the use and transfer of permits/credits.

The US Environmental Protection Agency has used continuous monitoring of SO_2 in the Emission Reduction Credit scheme (ERC) at each source to monitor and confirm compliance. It also administers the 'formal rules of the trading scheme, administering penalties associated with exceeding permitted emissions.

Institutional arrangements should minimise transaction costs, which represent a major threat to the success of a tradable pollution permit scheme. To kick start trading in the REgional Clean Air Incentives Market (RECLAIM), the regulator held an initial auction where firms could meet to trade permits. Private brokers now facilitate greater provision of information on quantities and prices.

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5   Addressing Market Failure: Externalities and the Role of Property Rights

One of the cornerstones of Institutional Economics is the seminal work by Ronald Coase on the 'problem of social cost' (Hirschey, 2003). In this work, Coase (1960) further examined the treatment of externalities expounded by Pigou (1920), widely accepted in the field of neo-classical economics and by implication environmental economics. Neo-classical economics perceives an externality to be an unintended cost (or benefit) borne (or enjoyed) by one party without compensation (or payment) due to the action of another independent party. For example, a firm discharging waste into a water course, avoids the cost of proper treatment and disposal (a private gain) by imposing a cost on downstream fishermen who suffer reduced catches in open-access fishing grounds (the loss of a public good). According to Pigou, this could be resolved by imposing a tax on the polluter equal to the damage to the fish stocks, thereby providing an incentive to change behaviour. Coase argued that an externality was more an issue of reciprocity and that the use of fiscal measures used often led to undesirable outcomes depending on the original distribution of property rights.

Property rights here are defined as a claim or entitlement to a benefit stream that the state will protect through the assignment of a duty to others who may interfere with that benefit stream (Bromley, 1991).

Consider a hypothetical example. For instance, a firm discharges dirty water free-of-charge into a river resulting in pollution, providing a private benefit to that firm, which avoids costs of abatement. However, this act has a negative impact on the property values and visual amenity in a nearby town. To control the pollution would reduce private benefits to the firm and increase social benefits to the town. Neo-classical

theory postulates that the firm would produce the pollutant as long as it was profitable to do so. One remedy would be for government to place a Pigovian tax, where the fee paid by the firm per unit of pollution is set exactly equal to the aggregate marginal external costs caused by the pollution when evaluated at the efficient level of pollution (point B, on Figure 7; where private benefits and social costs are equal). This would internalise the externality, removing scope for cost avoidance. Here the Government is intervening to remove entitlement for the firm to use the environment as a free good for waste disposal, at the same time recognising the entitlement of the town to uncontaminated waters. If the pollution continued, the town might claim for compensation to be paid out of tax revenues.

Coase viewed pollution as a problem of reciprocity rather than of externality, where the socially efficient solution is to maximise overall welfare (a combination of private benefit and social cost), not just to reduce the externality. Therefore, the problem is not about one party hurting the other, it is about how best to allocate entitlements within a society (Cerin, 2006).

This point was illustrated by what is now known as the Coase theorem which states that, subject to a number of rather simplifying assumptions, the socially efficient allocation of resources will be obtained regardless of the allocation of property. The Coase theorem is illustrated by Figure 7.

O   S   P

Quantity of pollutant >
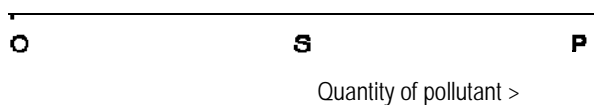
Figure 7: The Coase Theorem

In Figure 7, the marginal private benefits accruing to a firm from using the absorptive capacity of the environment is given by the line AP, while the marginal external costs to the local community is given by the line OC. If a firm is releasing all of its effluent into the stream (point P) then it receives a total private benefit of the area OAP. However, this has a total external cost of OCP. It can be seen that it would be beneficial for the local community to negotiate with the firm to reduce its level of discharge and thus reduce the total external cost. At output P, marginal external costs are infinitely greater than (zero) marginal private benefits. It would make sense

for the community to negotiate with the firm to reduce pollution, compensating for the loss of its private benefits. Successive bargaining would be mutually beneficial until point B, where the marginal private benefits (and cost of compensation) equal the marginal external social costs (benefits of abatement).

Coase found that this optimal solution would be the same if it were the local community rather than the firm that held the initial property rights to the use of the water course. At any point of production to the left of point B in Figure 7, it would be more efficient for the firm to compensate the local community for an increase in the external costs, as the private benefits would be greater than the amount needed to pay the compensation. Again bargaining would take place until it was not possible to further increase overall welfare. Note that a shift in one or both of the marginal benefit and cost functions in Figure 7 will change the optimum bargaining position.

Therefore, from this example, an efficient level of pollution will be achieved regardless of the initial distribution of property rights and, contrary to neo-classical theory, without the need for any government intervention. This conclusion was based on the same assumptions as neo-classical theory, namely:

- that participants in exchange do not incur transactions costs over and above the prices paid;
- that participants have perfect information that enables them to judge marginal benefits and costs now and into the future with certainty; and
- that participants have equal powers of negotiation and exchange.

Many of these prerequisites are not satisfied such that the theory often fails to apply in practice. Uncompensated externalities exist in the real world because high transaction costs prevent two parties from negotiating a mutually beneficial settlement and the distribution of benefits from any settlement will ultimately depend on who holds the property rights and their relative power (Anderson, 2004)

Transaction costs may involve financial and non financial costs, they comprise the following costs:

- *Information costs* are incurred when searching for opportunities for exchange, the characteristics of the good that might be exchanged, the willingness of participants to enter into an agreement and the details of subsequent ownership rights.
- *Contracting costs* include costs of bringing affected parties together for bargaining and deciding on the terms of an agreement, including drawing up an appropriate document to cover all eventualities.
- *Enforcement costs* involve costs of ensuring that parties keep to the terms of the agreement after it has been made. This includes monitoring the outcome of the agreement and taking action if the terms are breached.

The existence of high transaction costs make it difficult for parties to bargain over the existing allocation of property rights. Transaction costs relating to public goods exist mainly because information on, for example changes in ecosystems services, is costly to obtain. For instance, it is very difficult to predict an ecosystems exact

response to pollution. Furthermore, it is difficult to accurately determine the value of a public good since it is not available on the market. Hence, a major implication of such information costs is that is that governance institutions are likely to fail to anticipate all interdependencies between firms and society and will have to devise new control mechanisms as new environmental problems arise (Paavola and Adger, 2005). This reinforces the importance of adaptive management and governance referred to earlier.

As mentioned earlier, property rights bestow entitlements on the holders associated with ownership, possession, control and use. To be effective, property rights must be:

- *completely specified*: rights over cost and benefit streams should be comprehensively defined;
- *exclusive*: all rewards and penalties resulting from an action should accrue directly to the owner of the right;
- *transferable*: rights should be able to be exchanged so that they can be transferred to their highest value use; and
- *enforceable and completely enforced*: so that the previous conditions can be guaranteed, holders are secure in their entitlements and free of unlawful seizure.

Property rights are a perquisite for the smooth operation of markets. As mentioned above, however, inadequately defined property rights are often a source of externalities and hence market failure, and, linked to this, failure to safeguard the provision of public goods. The requirement that participants have equivalent bargaining power, unimpeded by differences in wealth, knowledge and skills, is a further source of continuing externalities. Local communities have difficulty challenging the resources, power and influence of international companies pursuing corporate ambition. Witness the ongoing disputes in the oil fields of Cross Rivers State in Nigeria, where there has been a persistent failure to negotiate a satisfactory resolution to the environmental impacts of oil abstraction and refining, with accusations that local leaders were 'bought out' by gifts from Federal Government pursuing its own interpretation of development. Failure to adequately compensate local communities for the loss of traditional lands to development projects in developing countries suggests the Coase theorem does not work in practice. Coase's theorem does little to explain the workings and impacts of the 18th century Enclosure Acts that disenfranchised the English peasantry from its common lands; other than to show the importance of a particular form of 'adaptive governance'.

Box 5 provides a case study of how property rights can be used to protect ecosystem functions, whilst providing sustainable access to ecosystem services.

Box 5: Reallocation of Property Rights to Manage Ecosystem Services with Respect to Fisheries

When formulating the European Union (EU) Common Fisheries Policy, decision-makers opted to allocate property rights based on 'equal access' rather than spatial boundaries to regulate access to resources. Property rights regulate fishing by means of controls of fish catches, limitation of fishing effort and the implementation of conservation techniques.

However, the lack of clearly defined ownership of the common property fisheries resources has encouraged irresponsible behaviour on the part of some EU fishermen. In an effort to counteract this uncertainty fishermen have reacted by increasing fishing effort (despite attempts at its control) and this has resulted in high rates of discarding, and a build up in illegal landings of prime species that are subject to pressure stock licensing. The net effect of these activities has been a catastrophic reduction in the biomass of the most important commercial fish stocks.

There are strong arguments that justify a property rights regime that confers access rights to the benefit of some and exclusion of others through a wider application of maritime boundaries; however, this contradicts the 'equal access' principle. The South Devon and Channel Fishermen's Association initiated and played a major role in negotiating voluntary agreements that reallocated property rights relating to crab fishing. This led to "gentleman's agreements" that have been translated from informal rights into effective management practise that has defined and protected rights for users and effectively moderated errant behaviour.

The creation of the arrangements has no doubt been facilitated by the relatively sedentary nature of the crab resource and its robust reproductive capacity. It remains to be seen how the agreements will cope with the continuing build up of fishing effort in the Channel, and especially whether the inshore boundaries will lose any of their effectiveness when they become Sea Fisheries Committee bye laws and, as a consequence, become aligned with the formal policy instruments of resource management.
Source: Crean (2000)

The relevance of transaction costs and property rights for the sustainable management of ecosystem services is expanded in the following section.

6 Relating Institutions, Transaction Costs and Property Rights to the Functions-Uses-Values Framework

The F-U-V framework draws attention to the importance of property rights. A single environmental resource, such as an area of land, may support a number of functions and provide a number of services, the rights to which may be vested with more than one individual stakeholder (Bromley 1991; Baltzer, 1998). Rights to production functions are usually vested in the land owner. The land may contain Public Rights of Way that confer access to everyone, providing they respect the entitlements of private owners. As referred to above, poorly defined property rights are perceived to be a main cause of environmental degradation (Tietenberg, 2003).

Historically property rights have been associated with direct use of ecosystem services, for instance for public water supply, agriculture and industry. These uses have, for the most part, focussed entirely on the production functions of ecosystems, with their value being reflected by the price of goods and services traded in the market. Consequently, the distribution of property rights and the institutions controlling their use have mainly evolved to regulate the uses of production functions (Hodge, 2000; 2001). This is illustrated in Figure 8, where the dominant allocation of property rights draw a line around the production functions, productive uses and market values.

Reinforcing earlier statements, many ecosystem functions and related services provide benefits for the public good are not part of the formal transactions that define the formal use of natural resources such as land and water (Adger and Luttrall 2000). Thus there is no incentive for 'owners' of property rights to consider the losses borne by third parties when such public benefits are lost or damaged. In other words, third parties (and society at large) often do not have automatic entitlement to a continued supply of the benefits associated with maintenance of ecosystems functions, unless of course special steps are taken to protect these services in the public interest. The case of over-abstraction of water for irrigation with consequences for recreational fisheries is an example. Thus, the ecosystem functions of regulation, habitat and information, which are particularly associated with public rather than private benefits, are often excluded from formal entitlements Furthermore, they may be lost or compromised when primacy is given to formal rights which serve private, mainly production and consumption interests. Once again, this confirms the critical importance of complete measures of social well being that accommodate public as well as private goods.
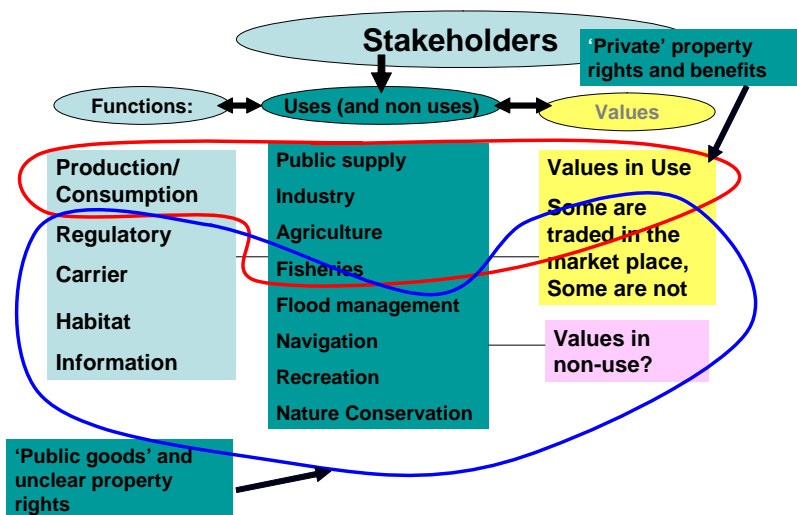

Figure 8: The Functions-Uses-Values Framework with Changing Priorities

This allocation of property rights has co-evolved with a reactive policy-making framework illustrated earlier by the DPSIR framework, mainly in response to severe environmental impacts on ecosystems. Growing concern about environmental degradation and increased realisation of the value to society of public goods that are put at risk as a result, has led to a redefinition of the boundary of property rights. Society is reclaiming entitlements to ecosystem services through environmental legislation and regulation: a kind of 'reverse enclosure' movement. Simultaneously this encroaches on the freedoms of individuals to do as they please. This may take a number of forms: a regulatory approach where society imposes restrictions on private operators: a voluntary approach in which operators see advantage in giving up some freedoms before they loose them anyway (possibly involving collective action), or a negotiated financial settlement along the lines of the Coase theorem.

This repositioning of entitlements to ecosystem services is clearly apparent in the evolution of environmental policies across UK landscapes. Farmers exercise their land tenure rights to use land for intensive farming, but are required to conform with agrochemical limits imposed by the Nitrates Directive, the compliance requirements on the management of field boundaries required under the Single Payment Regime, and in the case of pig and poultry producers, adopt best available technologies under the IPPC regime. In the Fens, entitlements to abstract water for irrigation are withdrawn in drought periods to protect other water uses, including conservation of natural peatlands. Statutory designation of Sites of Special Scientific Interest and Scheduled Ancient Monuments secure important habitat and information functions respectively.

These environmental requirements are essentially redefining conditions to obtain a 'licence to operate'. In the industrial sector, a plethora of regulatory policies that cover waste, energy, transport, housing and industrial processes have redefined the boundary of acceptable minimum standards for environmental protection. Examples include: Control of Substances Harmful to Health (COSHH), IPPC, and a range of waste directives covering, for example, packaging, landfill and electrical and electronic equipment.

It is apparent that over time, the reference point for minimum environment standards has risen as illustrated in Figure 9, representing a redistribution of entitlements in favour of the public interest. Over and above this reference point, however, society can expect to pay providers of ecosystem services. For example, agri-environment schemes 'compensate' farmers for providing environmental services, such as landscape enhancement or storage of floodwaters, over and above that required by compliance with minimum regulatory standards.

A key challenge for sustainable environmental management is to find mechanisms whereby entitlements to ecosystem services can be built into property rights and policy mechanisms in order to maximise overall welfare. Much of agri-environment policy, for example, is redefining entitlements, supported by incentives to land managers, with a view to reconciling competing objectives (Morris *et al.*, 2000). The WFD is similarly redefining entitlements in favour of the water environment, to the point where some critics referred to it as an ecologist's charter. Modifying property rights to protect and enhance ecosystems services (and underlying functions) however, does not seem to have the same urgency in the spatial planning and especially the housing sector; and yet this is one sector, especially that it engages the entire population, where the impact could be greatest.
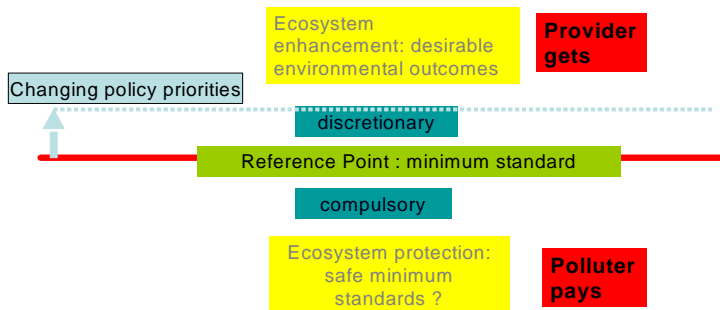
Figure 9: Reference Point for Environmental Management

Redefining property rights is a politically sensitive issue, especially as it affects the distribution of wealth and income. Furthermore, modifying property rights for individual ecosystem services and functions is difficult. A more pragmatic and acceptable approach is likely to involve market and fiscal incentives to promote particular ecosystems services (and disincentives for actions that damage them). Differential charges for fuels, modes of transport, house design, farming practices according to the relative size of the environmental footprint are examples of incentive regimes. All of these interventions are likely to have income effects in the short term and there may be a need for measures to safeguard the most vulnerable groups.

An alternative strategy is for governments to purchase comprehensive property rights outright to secure ecosystem functions and services flows for society. This might involve retention by a public body or transfer in trust to designated groups that have a vested interest in protecting ecosystem functions. For example, the Government recently assisted the purchase of over 100 ha of agricultural land for the Great Fen (Restoration) Project in Cambridgeshire. Non Government Organisations, such as the Royal Society for the Protection of Birds, also purchase property to promote particular non-production ecosystems services, drawing on funds from members as well as some environmental funds from Government sources.

6.1   Ecological Conditioning

The preceding discussion on environmental reference point can be used to promote the principle of 'ecological conditioning'. In essence, sustainable development implies non deterioration in natural capital, ecological functions and related goods and services. Infringement of any or all of these in part or whole would be construed as a tort or nuisance. Similarly, ownership of that Natural Capital would entail a requirement at least to maintain it, and where it had been damaged as a consequence of previous activity, to reinstate it through ecological restoration. This requires a normative approach far enough in advance of any environmental "tipping point" that might lead to catastrophic failure in ecosystem functions, such as, for instance, increases in amplitude and frequency of overwhelming natural disasters associated with hurricanes and flooding. This can only be achieved by adopting

minimum environmental standards for conserving and enhancing ecosystem services at a regional and local scale.

An illustration at the level of a firm is where an increase in production that improves income would only be permitted if the firm's ecological footprint became no larger, or shrunk. Financial rewards could be delivered to the firm if the footprint shrank (i.e. above compliance). In other words the only permitted development would be one that does not impact on the delivery of ecosystem services as a whole by the firm. Setting minimum ecological standards would be a national and local legislative exercise. In effect the EU and its member states would aim to shrink their ecological footprint to be the same size as the land mass they occupy. It is probably only at National or International scale, informed by increasing scientific understanding, that robust prediction can be made sufficiently far in advance to enable setting of local environmental limits.

6.2   Water Issues

These issues are also evident in the case of water: managing water resources to provide the right amount, in the right place, at the right time for the needs of humankind. Thus the debate tends to be about supply and 'uses' involving dams, pipes, floods, domestic water use, irrigation and water costs, rather than functions such as regulation and habitats, and services such as soil moisture and ecological water quality. New legislation such as the WFD is however promoting an ecosystems perspective that sets minimum standards for ecological water. WFD, correctly from an economics viewpoint, recognises the validity of water production and consumption functions, allowing for time-bound 'derogation' from ecological reference conditions where the costs of doing so are deemed to be excessive.

The water cycle is second only to the geological cycle in terms of its movement of mass, and its processes occur much more rapidly. Water is therefore moving a range of particles as solute or particulate load, around the planet all the time. The range of ecosystem services provided by water, be they production (e.g. food, biomass), regulation (e.g. floods, climate, nutrient cycling), carrier (navigation), habitat (wetlands), or information (e.g. tranquillity, landscape) shows it as an implicit player in almost all elements of ecosystem service. Nutrient cycling in soils across the planet, for example, needs water to occur, and not just some water, but the right amount of water. The interaction of water, soil, vegetation and biota is fundamental to the functioning of the planet.

Growing water deficits and the failure of conventional supply responses to meet growing demand have led to calls for 'demand-side' management and for water to be regarded as an economic, potentially tradable commodity. There is a risk, however, that this emphasises the production and consumption values of water to the exclusion of other ecosystems functions and services referred to above. There is a need explicitly to build in such considerations in water resource management plans, such as Catchment Abstraction Management Strategies (CAMS) and Catchment Flood Management Plans (CFMP)

6.3   Institutional Change in the UK Spatial Planning System

The UK spatial planning system has mainly been concerned with conservation of particular characteristics of urban and rural landscapes. The need to protect the English countryside, for example, is deeply embedded in the system. The metropolitan greenbelt was promoted as a lung for Londoners (Ward, 1994). Recent post war development regimes, cast the city in a paternalistic role overseeing 'mother nature' as provider of food and energy supplies and building materials. Indeed, Abercrombie (1944), with allegories that might now be regarded as dated, patronising and somewhat tainted, argued that the city 'as an adult male' should take on the moral duty of care and stewardship for the environment as a husband should to his wife.

However, Healey (2006), not surprisingly, notes that such conceptions are a now long way from scientific, materialist and indeed practical views of the environment. Healey articulates a range of new biospheric concerns that require response from the UK spatial planning system. These include: the environment as a stock of assets; environmental systems and carrying capacities; the environment as our world; the environment as cultural conception. It is clear, from Abercrombie's and Healey's take on the environment that views vary over time and space. It is critical however, that the views from one period, however appropriate, embed themselves in immovable planning regimes that act as barriers to beneficial change in another very different period.

For the most part the UK planning regime has adopted a development control rather than development support perspective. Some would argue that rural planning for example, combined with strong support to agriculture, for a long time prevented alternative land use and enterprise in the countryside. The reduction of production and income support to farmers has exposed the rural sector to a vulnerability borne of over dependency on a single, highly subsidised sector. A tour of rural areas in other European countries, such as parts of Spain and Italy, can reveal more diverse industrial rural economies that have not unduly interfered with traditional rural landscapes.

It is increasingly recognised that the UK spatial planning system is failing to deliver sufficient housing or protection of ecosystem services. It inadequately accounts for the ecological footprint in the design and the location of new housing development. The inability of the planning system to prevent construction of at-risk housing in flood prone areas, in spite of PPG25, is a case in point. It is apparent that the planning system does not demonstrate evidence of ecological learning that informs management and governance. It seems to demonstrate all the signs of institutional 'lock-in', serving the vested interests of key stakeholders, including powerful government agencies, rather than adapting to the new realities. Incrementalism does not appear to be working: it may be time for a systemic radial review.

> **Box 6: The Challenge of Changing Property Rights to Protect Ecosystem Services: a Case Study of Tourism**
>
> Tourism is viewed in many industrial nations as an environmentally friendly way to revitalize distressed rural economies and communities. In the forest regions of Dalarna, Sweden and interior Maine, U.S.A, hopes are pinned on nature-based tourism, with the presumption that their ecosystem services are underutilized.
>
> However, the ecosystem services are non-exclusive and non-rival; therefore, land uses mis-aligns incentives facing landowners, tourists, and recreation businesses. This has caused congestion, reduced economic opportunity, depressed production of non-recreational goods and indications of environmental degradation.
>
> Property rights perceived as critical institutions 'that link society to nature and have the potential to coordinate human and natural systems in a complementary way for both ecological and human long term objectives'. At present property rights in the two case study areas do not protect ecosystem services, and intervention are needed to :
> 1. keep demand pressure within ecosystem capacity limits at prime sites at peak times;
> 2. balance tourism and non-recreational activities in multi-function ecosystems;
> 3. control cumulative, irreversible landscape transformation; and
> 4. strengthen landowners' incentives to invest in conservation and value added tourism.
> Source: Vail and Hultkrantz (2002)

7 Application of the Theory of Collective Choice for Management of Ecosystem Services

Many ecosystem services have the characteristics of public goods and many are associated with common pool, open access resources, such air and landscapes, and rivers and lakes. Public goods are put at risk when the underlying ecosystem functions that support them are lost or damaged, often as a result of decisions by individuals exercising their private property rights. Collective choice theory can provide a framework for developing institutions to manage natural resources at a group rather than an individual level.

Collective-choice theory, also known as collective-action theory, began as an effort to refute the doomsday scenario presented by Hardin (1968) regarding the inevitability of the well-known 'tragedy of the commons'. Hardin predicted that people with access to common land will continue to increase their marginal use of that land until it is overexploited and exhausted, an outcome that he thought was predictable for all commons and indeed all public goods. Under this scenario, rational, utility-maximising individual behaviour leads to an outcome that is sub-optimal and detrimental to everyone, and therefore both irrational and tragic (Marshall, 2005).

Such problems are evident in contemporary society, for instance: even though petroleum is not, strictly speaking, a communal resource, its unrestrained consumption today, the resulting build up of CO_2, and rapid global warming are perhaps the most obvious and threatening examples of this kind of social phenomenon. Tragic outcomes of this kind were, according to Hardin, avoidable only through the intervention of a strong State that would coerce people into obeying and acting in their long-term best interest, or, alternatively, through devising rules and

institutions for the use of the resource in question and dividing it up so that the costs of overuse, and not just the benefits, were internalised by the individuals involved.

Collective choice theory argues that individuals are willing to work together to make choices regarding the use of natural resources and other 'public goods' that people hold in common, or as a group, based on the expected utility of their options (Ostrom, 1990; Dolsak and Ostrom, 2003). They are willing to give up some individual freedoms in pursuit of actions that serve both the collective and, within this, the private good. Therefore, collective choice does have parallels with the principles of Coase (1960), where in the absence of the state, as long as transaction costs are low, and mechanisms are in place to facilitate negotiation, different parties will bargain to an optimal use of the resource in question.

Collective-choice problems pose a social and moral challenge to a group or community of resource-users, whose choices and their mutual welfare are intertwined. This is because individual acts of consumption of the common pool resource are reciprocal and interactive in nature, where consumption by an individual will affect the availability of the resource for other users of the resource both in the short and long run. People who engage in collective action are most concerned with minimising the pervasive risk that some resource users who fail to cooperate and restrain their consumption after a decision by the group to do so will receive the benefits of other people's self-restraint regardless and be able to "free ride" (National Research Council, 2002). People therefore try to develop institutions—rules, principles and procedures that shape and reinforce peoples incentives, both positive and negative, to exercise mutual self-restraint and use the resource in a sustainable way, especially by providing for monitoring of individual behaviour and the reliable issuing of any necessary sanctions (Ostrom, 1990). The formation of those institutions, and the task of providing assurances that they will work, are themselves major transaction costs whose nature and magnitude will affect the choices by the individuals involved.

Ostrom (1990) has listed the key elements of successful collective action with reference to some kinds of natural resources.

Table 2: General Principles for Successful Management of Natural Resources

Autonomy – the local community or user organisation has and controls its own stock of resources, which are typically not adequate to fully meet everyone's practical needs. Higher-level institutions of governance encourage this autonomy .
Contiguity – the exploited or managed area served is firmly bounded and spatially defined
Uniformity – everyone receives the right to harvest, abstract or use resources with the same frequency [one defining component of "*equity*" or fairness]
Proportionality – [the other component of *equity*] individual *rights* to harvest or exploit resources are related proportionally to each other, as are accompanying *duties* to contribute to the costs of operation and maintenance, of the ecosystem
Transparency – the rules for allocation and those governing access and management are known to all users and compliance is capable of being monitored by all.
Regularity – the rules for allocation and harvesting are always the same under scarcity, with no exceptions (except perhaps for emergencies) and no unauthorized expansion of the system.

It can be seen that Table 2 refers to similar criteria to those specified for effective property rights, in this case for common pooled resources. The regulatory structure is also transparent and attempts to minimise transaction costs for participants. The interaction or mutually-reinforcing effect of a simple set of principles clearly defining property rights, lowering transaction costs, creates a clearly-perceived compatibility between individual self-interest and the common good.

There are many examples of efforts by local people in rural areas throughout the UK to achieve sustainable forms of co-operation; social experiments have emerged spontaneously, particularly among the country's farmers.

Box 7: Collective Action Amongst Upland Farmers

A small-farmer cooperative comprising ten households in Pont Bren, mid Wales formed in 2000 in response to falling subsidies for sheep rearing, which left individual farmers economically vulnerable and with degraded ecosystems following years of intensive livestock rearing. The cooperative began as mutual-aid among three of the original members in a forestation effort, planting trees, which, once the reciprocity of the activity became evident (e.g., hydrological improvements in the groundwater regime), neighbouring farmers joined to expand the group's activities.

The rights and duties of the group members are entirely uniform (and thus also strictly proportional to each other) and, since the group has remained small and based simply on reciprocity and mutual trust, there has been no need to formalise those institutions legally or even to elect any officers. Economies of scale have allowed the farmers to invest in new economic activities such as a tree nursery, investment in new breeds of sheep for producing meat and a cooperative farm shop. By working their land cooperatively and wisely, and jointly negotiating funding for environmental enhancements at the landscape rather than individual farm scale, the group has experienced significant economic, ecological and social benefits.

Box 8: Collective Action Amongst Water Users

Another example of the successful application of collective choice theory to natural resource management is The East Suffolk Water Abstraction Group (ESWAG). This organisation comprises roughly 120 members and was formed in 1997 in response to demands by the regulatory Environment Agency (under the 1991 Water Act) to decrease groundwater withdrawals for irrigation in response to the 1989-92 drought and, somewhat later, to impose bans during the 1996-97 irrigation season. The group's main purpose today is to secure access to the water given growing pressure on water supplies due to increasing demands from other users.

ESWAG adopted a formal constitution in 2002, when it successfully applied for a grant from Defra and the England Rural Development Programme to appoint a Company Secretary and help to establish a Company Limited by Guarantee. Annual membership charges are based on the size of abstraction licences. The group provides mutual benefits for all its members, delivering a significant degree of security over individual abstraction licenses and a kind of countervailing power to balance that of the Regulator and other dominant local interests. The group explicitly promotes good irrigation practices in pursuit of the wise and sustainable use of groundwater.

Successful cases of collective action such as these involve individuals giving up some of the expected return from use of a resource so that it can be used more sustainably in the long term. The idea that ecosystem services can somehow be managed in the same way and treated as a form of common-property governed by a similar set of principles that govern collective action in the management of natural resources is most easily demonstrated in the case of water, a scarce and vital resource whose quality, and even to a significant extent its

quantity, are directly dependent on the provision of ecosystem services at different many scales and levels of analysis.

8   Alternative Measures of Development

8.1   Alternative Approaches to Measuring Development and Welfare

The Standard National Accounts (SNA) framework was designed to produce estimates of the value of Gross National Product (GNP) and Gross Domestic Product (netting out income from abroad) for macroeconomic planning, and was not intended as an indicator of well being or economic progress. The SNA framework assumes:

GNP = Consumption + Investment + Government Expenditure + Net Exports + Foreign Property income

Net National Product (NNP) = GNP – Depreciation of manufactured capital assets

In recent years, there has been concern that these measures provide neither an accurate reflection of current or potential future welfare of the economy and its citizens. For example, no allowance is made for negative externalities (Simon and Proops, 2000), both environmental and social (such as sense of community), the state of natural resource stocks and services rendered, issues of distribution and equity, human capital, and services which are unpaid for. There is no accounting for the depreciation of natural capital, nor for untraded ecosystem services, and public goods as a whole. Indeed, expenditure on environmental mitigation and clean up register as a positive economic activity and a contribution to GNP.

Approaches to Green National Accounting were first developed in the 1970s (Solow, 1974; Hartwick, 1977) reflecting a concern that environmental damage caused by production and consumption has a negative effect on human wellbeing, and the depletion of natural resource stocks is not counted.

The Integrated Environmental and Economic Accounting (commonly referred to as S(tandard)EEA) was first published in December 1993 and attempts to put monetary values of environmental depletion and degradation in order to inform mainstream policy (UN SEEA, 2003). At a European level, two projects, GARP and GREENSTAMP provide theoretical frameworks for green national accounting. The latter adjusts estimates of national income to allow for expenditures necessary to secure environmental standards compatible with preserving the ecological base required for sustainability. A further approach, that of Genuine Savings uses total wealth as a sustainability indicator (Pearce and Atkinson, 1993), deducting the value of depletion of natural resources and the value of accumulation of pollutants from conventional measures of net investments. Rather than focussing on sustainability per se. the Index of Sustainable Economic Welfare (ISEW) (Daly and Cobb, 1989) attempts to derive a measure of social well being by making adjustments for expenditures and incomes which are deemed to reflect quality of life.

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┌─────────────────────────────────────────────────────────────────────────┐
│ Box 9: Index of Sustainable Economic Welfare (ISEW)                        │
│                                                                            │
│ Adjustments are made to national accounts to reflect impact on well being, │
│ for example, as follows:                                                   │
│                                                                            │
│ ISEW  = Personal consumption adjusted for income inequality         1164   │
│ (a)     + Services of household labour                               520    │
│ (b)     + Services of consumer durables                              225    │
│         + Services of highways and streets                           18     │
│         +Consumption portion of public spending on health and education 45  │
│ (b)     - Spending on consumer durables                              235    │
│ (c)     - Defensive private spending on health and education         63     │
│         - Costs of commuting and auto accidents                      67     │
│         - Costs of personal pollution control                        5      │
│         - Cost of air, water and noise pollution                     39     │
│ (d)     - Loss of wetlands and farmland                              58     │
│ (e)     - Depletion of non-renewable resources                       313    │
│ (f)     - Long-term damage from nuclear wastes, greenhouse gases and       │
│           ozone depletion                                                   │
│                                                                      371    │
│ + Net capital growth                                                 29     │
│ ± Change in net international investment position                    34     │
│                                                          = $818            │
└─────────────────────────────────────────────────────────────────────────┘
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This framework has been applied in several countries including the USA, Italy, Sweden, Austria, Australia and the UK. The general conclusion is that sustainable economic welfare has risen much more slowly than GNP, and may even have fallen since 1980.

Attempts have also been made to derive estimates of the value changes in ecosystem functions and services mainly at highly aggregated global (see Costanza, 1997, for the value of World ecosystems), and sectoral level (see Pretty *et al.*, 2000; Hartridge and Pearce, 2001; Atkinson *et al.*, 2004, for the external costs and benefits of UK Agriculture). These studies make three main points: ecosystems services have significant anthropogenic value; it is difficult to derive complete estimates of value because of data and methodological issues; interventions to protect and enhance ecosystems services are valid on social and economic grounds.

The identification and valuation of natural capital and ecosystem services is essential to inform rational, integrated environmental policies that meet the criteria of effectiveness and efficiency. This requires a major commitment to interdisciplinary research and information management that combines environmental and social sciences. New research methods, involving environmental risk modelling, spatial (GIS type) analysis and participatory methods to obtain social preferences and values, have considerable potential to support the design and implementation of suitable regulatory regimes.

9   Conclusions

This Annex has reviewed the current policy framework for environmental regulation with a view to identifying the scope for better integration of policy measures particularly regarding the protection and enhancement of ecosystems functions and services.

The main messages are as follows:

- Environmental policy has been mainly reactionary to actual and more recently potential environmental risks. It has also tended to be fragmented and in some cases conflicting. The use of the DPSIR framework encourages a reactionary perspective.

- The policy framework is not responding to the growing discourse on ecosystem functions and services and their critical contribution to social well being

- Damage to ecosystems functions and services is strongly linked with deficiencies in institutional frameworks, particular ill-defined property rights that lead to market failure and policy failure.

- There is clear evidence of institutional inertia: the spatial planning system for example, operates under a historic regime that serves entrenched interests that for the most part cannot, and often do not wish to, place the enhancement of ecosystem services as a key development goal.

- There is a clear need for a better definition of social well being that adequately accommodates the key role of natural capital and ecosystem services.

- There needs to be a better understanding of the relationship between human activity, ecosystems services and social well being, and this understanding needs to inform new types of adaptive management and governance.

- There is a clear role for encouraging individual and collective actions to moderate behaviour in order to achieve more sustainable outcomes: but such examples of constrained consumption for the greater good need to be shown to work.

- Environmental policy needs to be fully integrated with policy for the major economic sectors such as industry, transport, energy, housing. Reliance on sustainability appraisals more recently applied in areas to development proposals suggests this is not currently the case.

It is clear that a paradigm shift is required to put ecosystem services at the centre of development management. The current incremental approach provides a second best approach.

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Key Terms

DPSIR framework - provides a conceptual framework for identifying and exploring the linkages between drivers, pressures, state (of natural resources and environment), (anthropogenic) impacts, and policy responses.

Coase theorem – states that the socially efficient allocation of resources will be obtained regardless of the allocation of property rights, assuming: zero transactions costs; and no wealth effects.

Collective choice theory –argues that individuals are willing to work together to make choices collectively regarding the use of natural resources and other 'public goods' that people hold in common, or as a group, based on the expected utility of their options. They are willing to give up some individual freedoms in pursuit of actions which serve both the collective and, within this, the private good.

Ecosystem services – a framework for analysing the benefits that society derives, directly or indirectly, from ecological systems. Services, sometimes referred to as functions, underpin uses and values.

Externality - a cost or a benefit that is not borne or not received by the economic agent who has produced it.

Functions – properties or processes within ecosystems, for instance: production of biomass; climate regulation; provision of habitats; a setting for recreation.

Uses –anthropogenic use and non use of ecosystem services.

Values – stakeholder values and preferences associated with use and non-use of eco-system services.

Institutions - rules and conventions that facilitate co-ordination among people regarding their behaviour, including formal and informal systems, elements of social capital and policy frameworks.

Natural Capital - the mineral, plant, and animal formations of the Earth's biosphere when viewed as a means of production of oxygen, water filter, erosion preventer, or provider of other natural services. It is one approach to ecosystem valuation, an alternative to the traditional view of all non-human life as passive natural resources, and to the idea of ecological health.

Property right - a claim to a benefit stream that the state will protect through the assignment of a duty to others who may interfere with that benefit stream.

Public good – goods and services which, once produced, can be consumed by everyone in society. Consumption by one individual does not diminish the ability of another to consume the same good.

Transaction cost – The cost of completing a transaction above the cost of the good or service being exchanged.