Regional sustainability appraisal and climate change

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Introduction

Climate change is a global and local issue of vital importance with environmental, social and economic dimensions. It might be expected that strategic environmental assessment (SEA), as an *ex ante* assessment process for plans (such as land use plans), would take full account of the implications of climate change for the plan, and of the plan for climate change.

This paper examines one form of SEA – that of sustainability appraisal - employed in English regions, and argues that, while these appraisals have addressed many issues of relevance under climate change, they have not assessed the complex interactions of policies to mitigate or adapt to climate change. The paper offers some possible explanations for this, and concludes with some recommendations to improve practice.

SEA can address first and second order impacts, and cumulative and synergistic effects, and lead to decisions which can prevent or minimise any expected adverse consequences. In particular, such assessments could assess the impacts of a plan on the causes of climate change (such as the contribution of the plan to the emission of greenhouse gases, or provision of renewable energy sources) and the impact of any unavoidable climate change on the plan (Larsen and Kornov, 2009). As climate change has become more fully acknowledged as an issue, there have been calls for greater integration of policies to mitigate and adapt to climate change (such as Swart and Raes, 2007). For instance, SEA might address the indirect impacts of mitigation measures on adaptive capacity: one example is the promotion of biofuels as a low carbon energy source, and its negative impacts on biodiversity and hence the capacity to adapt to future changes in climate (Berry et al, 2009).

However, it is evident that, for a number of reasons, SEA (and EIA) have not addressed the interaction of mitigation and adaptation, nor indeed have they wholly addressed climate change. This is confirmed by the EU in 5-year monitoring reviews of the EIA and SEA Directives (CEC, 2009a & b).

SA of regional spatial strategies in England

From 2004-2009, regional spatial plans in England were prepared, which set out the objectives and development policies for the region, addressing the scale and distribution of housing, environmental protection (such as biodiversity and landscape), transport, infrastructure, waste, minerals and economic development. These spatial plans take a time horizon of 2021 or 2026. The government has required

that all regional spatial plans be subject to Sustainability Appraisal (SA) during plan preparation. These Appraisals incorporate the requirements of the SEA Directive, but with more emphasis on the range of socio-economic issues (such as access to employment, and provision of affordable housing) and on achieving objectives, and a less full description of baseline environmental conditions. They share many of the advantages of SEA, in integrating issues in a systematic way, challenging assumptions, and ultimately strengthening plans (Carter et al, 2009).

The guidance on these Appraisals (ODPM, 2005) recognises that climate change is an example of an issue with cumulative, secondary or synergistic effects, and argues that these are best dealt with at regional level. It follows the SEA Directive in taking a fairly narrow interpretation of climatic factors, as just one factor amongst others. But it does suggest some ways in which climate change issues of mitigation (such as greenhouse gas emissions) and adaptation (such as flood-risk) might be addressed through headline objectives, decision-making criteria and detailed indicators.

Sustainability Appraisal treatment of climate change

While the appraisals broadly followed government guidance in focusing on reduction of carbon emissions and attention to flood-risk, they went further than that in addressing significant impacts of climate change. For carbon emissions, they addressed especially emissions from buildings, transport and waste, and examined policies to change sources of energy generation through the promotion of alternative, renewable resources. All regions have needed to take more seriously the carbon implications of their development patterns.

For adaptation, Carter et al. (2009) concluded that the Appraisals had assessed flooding as part of a wider SA objective related to climate change, and that over half had led to changes in the plans' content, strengthening the approach to flood risk though means such as further promotion of sustainable approaches to flood risk management. By the end of the process of regional plan formulation and adoption by 2008-09, the SAs had also addressed wider impacts of climate change, such as vulnerability of infrastructure, coastal erosion, and risks of over-heating and thermal discomfort. In this short paper, we cannot review all climate change issues, but focus on two worth particular mention: water resources and green infrastructure.

Water

Perhaps because of the emphasis on flood-risk, and because the UK has traditionally been seen as a country well-endowed with water supplies, there has been little government guidance on the approach to water resource issues in plan-making or in SA. Nevertheless, there is already evidence (Environment Agency, 2008) that water-stress exists in many parts of the country (especially where there are conflicts between abstraction of water for agriculture, for cooling (as part of energy generation), for domestic consumption, and a need to return more water to the natural environment for biodiversity conservation). Climate change projections for the UK suggest that future patterns of precipitation, with less summer rainfall and more winter rainfall, probably falling in more intense precipitation events, will place further stress on water-resources. The SAs have all addressed issues of water resources, especially those in

the eastern half of the country (such as in Yorkshire and Humber (EDAW et al, 2008; LUC, 2008), and the South East (Scott Wilson and Levett-Therivel, 2009)).

Green infrastructure

In all regions, the combination of the sustainability appraisals with assessments of the plan impacts on sites of European conservation value (part of the Natura 2000 network) has strengthened the ecosystems approach, especially in the provision of policies for green infrastructure. Green infrastructure can be defined as a strategically planned network of multi-functional green spaces, both new and existing, urban and rural, which supports natural and ecological processes and is integral to the health and quality of life of communities. It has benefits under conditions of climate change, such as improving health, moderating flood risks and the urban heat island, integrating urban and rural areas, and biodiversity. Green infrastructure can address climate change adaptation, and (through its encouragement of modes of travel such as walking and cycling) assist in climate change mitigation. The regional plans provide one example where the possible synergies of actions to mitigate and to adapt to climate change can be reinforced through the SA process.

However, overall none of the SAs of the regional plans gives systematic consideration to the interaction of climate change mitigation and adaptation in assessing the impacts of development options of the plans, nor the policies adopted to address certain assets.

Limitations on SAs' approach to climate change

It is worth exploring the reasons why this is so. This paper suggests that the explanations can be found in factors external to and those internal within environmental assessment.

One factor is the uncertainty of climate change and the difficulty of making predictions. Perhaps as a result of this reluctance to address uncertainty and uncertain futures, time horizons taken in most SAs in England are short, focusing more on contextual regional plan periods (such as 20 years) than on the life-time of the resulting developments. The appraisals did not consider the likely evolution of the baseline even over the plan period. Broad political and economic conditions also favour short-termism. The consequence has been a reluctance to envisage radically different futures, even though techniques such as the use of scenarios or story-lines are available (Byer and Yeomans, 2007).

A second set of possible explanations lies in the institutional context within which such plans are framed or projects developed. While the ideal of integration is promoted, it is difficult to achieve. The SA and climate change practitioner communities have developed separately, with significant terminology, such as the term "mitigation", having rather different meanings (that is, reduction of the causes of climate change, as opposed to the meaning in EIA of reducing the impacts of a plan); and the mitigation and adaptation policy communities have different assumptions and backgrounds (Swart and Raes, 2007).

There may also be reasons internal to the EA profession and policy community. Climate change is not solely a physical phenomenon, but a social and economic one,

requiring inter-disciplinary approaches to problem identification and assessment of options for solutions. But the EA community has, if anything, become more fragmented with specialist disciplines and interest groups, for instance within the International Association for Impact Assessment (IAIA) (Burdge (2009)).
This fragmentation might also explain why, even though a consideration of interaction between impacts is required by the EU Directives, and most EIAs are undertaken by multi-disciplinary teams, interactive impacts are not well-handled (CEC, 2009a).
It is also possible that the EIA process has become somewhat formulaic, relying over-much on guidance or precedent, and focusing on process rather than substantive content. Perhaps the SA guidance (ODPM, 2005) constrained SAs to treat climate change as a set of limited objectives – such as reduction of greenhouse gas emissions or of flood-risk – amongst other objectives, rather than as an opportunity to assess impacts holistically and over time. (An example might be to use climate change and socio-economic scenarios to project possible changes in baseline conditions and the impacts of the plan under these scenarios). Guidance on addressing climate change issues within SEA has been available (Levett-Therivel et al, 2007), but precise ways of addressing interactions between mitigation and adaptation are not provided.

Integrated assessment of climate change mitigation and adaptation

Sustainability appraisals could add to this process a systematic and comprehensive analysis of the impacts of climate change, and in particular an integrated assessment of interactions of climate change mitigation and adaptation policies and measures.

A few ways in which this might be done in sustainability appraisal (and in SEA) are:

- in setting their objectives, SAs should expressly include addressing the interaction of climate change mitigation and adaptation
- SAs should pay particular attention to time horizons – not being limited to the plan period (which in the UK, by contrast with the Netherlands, for example, is short). In this way, future changes in the baseline environment can be projected. This process can make use of estimates of climate change by international, European or national climate change scenarios (such as Defra, 2009)
- some simple tools for assessing interactions should be used: at the most basic level, a simple compatibility matrix (as indicated in Figure 1) might indicate some of the interactions. Inconsistent interactions might include the consequences for emission reduction of a spatial pattern which, in avoiding areas at increased risk of flooding under climate change, allocated land further from urban centres, leading to further travel via unsustainable modes, and therefore increased carbon emissions, so exacerbating climate change and adding to flood risk. Consistent interactions might be water-efficiency as adapting to water-shortage but also reducing energy consumption.

Such recommendations should be timely: more work is underway in England on a new set of regional strategies, with an emphasis on policies to implement the UK's Low Carbon Transition Plan; professional bodies are issuing advice on handling climate change; and the European Commission is likely to extend the scope of the SEA Directive to address climate change. In conclusion, SEA and SA have an important role of innovation and experiment in addressing climate change interactions more systematically and so meeting sustainability objectives more fully.

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Figure 1 Climate change mitigation and adaptation consistency assessment

	Mitigation action 1	Mitigation action 2	Adaptation action 1	Adaptation action 2
Mitigation action 1				
Mitigation action 2	✓			
Adaptation action 1	**?**	✓		
Adaptation action 2	✓	**x**	**x**	

Legend: ✓= consistent x = inconsistent ? = uncertain