climate change

Scotland's centre of expertise connecting climate change research and policy

Potential win-wins and conflicts or trade-offs between climate change mitigation and adaptation

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1. Key Points

- There are several areas of synergy between adaptation and mitigation aims, particularly in the rural land use sector.
- Targeting win-win actions may be cheaper and more effective.
- However, win-wins may not always represent the most effective or efficient action.
- Conflicts also exist. There will be some instances when an action that conflicts with other aims remains the most effective for achieving a given goal. In this case it will be important to identify the trade-offs and to put actions in place to minimise them.

2. Introduction

Drawing on insights from ClimateXChange's comparative review of adaptation strategies and ClimateXChange's wider expertise, this paper summarises some of the key win-wins, conflicts and trade-offs between mitigation and adaptation[1] policy objectives. Due to the time available to us, the list presented below is necessarily not comprehensive, but it will serve to highlight areas where attention should be paid to the relationship between policy efforts on mitigation and adaptation.

Historically, adaptation and mitigation to climate change have been treated separately, both in policy as well as academic/research domains. Mitigation has typically taken precedence, often due to international policy commitments to reduce carbon emissions. As a result, mitigation and adaptation policies have evolved in very separate and different ways.

[1] It is assumed readers are familiar with the concepts of adaptation and mitigation. In this report, the term resilience is used in conjunction with adaptation. Resilience is defined here as 'the ability to anticipate, absorb, accommodate or recover' (IPCC, 2012), and greater resilience will enable successful adaptation to climate impacts

However there are potential advantages to considering the two together, including:

- Opportunities for synergy (win-wins between the two goals of adaptation and mitigation actions[2])
- Cost effectiveness
- Avoiding conflicts, trade-offs, perverse incentives and unintended consequences

Considering adaptation and mitigation together may work better in some sectors than others and in some cases trade-offs will be unavoidable. However, it is important that at a minimum, policies do not undermine each other and therefore an awareness of the potential relationships remains important. The focus in this paper is generally on the broad aims and goals at the policy level, although in some cases specific actions are used to illustrate points made.

This report begins with brief examples of how other countries have begun to integrate adaptation and mitigation policy. As Scotland is in the early stages of identifying synergies, examples from other countries may be of use. Scotland's Report on Proposals and Policies (RPP) (Scottish Government 2011a) is then screened with respect to the interactions of mitigation policy with adaptation goals. This is combined with more general points about possible interactions between mitigation and adaptation within each chapter of the RPP. The Scottish Government's '10 Key Behaviour Areas Set' (Scottish Government 2011b) is also examined for possible effects on adaptation. Information has been gathered from literature sources and consultation with experts within ClimateXChange.

3. Examples from other countries

Other countries are beginning to recognise the importance of considering the relationship between adaptation and mitigation. The German Adaptation Strategy[3] underlines the need to identify and exploit potential synergies between mitigation and adaptation, and to give preference to measures which contribute to both. It also highlights the potential for conflicts to occur and that these should be alleviated, if possible, via intensive consultation on integrated approaches.

The New York City strategy[4] clearly states that adaptation planning should not be done in isolation, and that a coordinated approach can promote cost-effectiveness and the development of synergies between mitigation and adaptation.

The IPCC Fourth Assessment Report also identifies the need to develop a decision framework that encompasses both mitigation and adaptation: "Responding to climate change involves an ***iterative risk management process that includes both adaptation and mitigation***, and takes into account climate change damages, co-benefits, sustainability, equity and attitudes to risk" (IPCC, 2007).

[2] A related report considers examples of 'no-regret', 'low-regret' and 'win-win' adaptation actions (Martin, forthcoming), where synergies with mitigation aims provide win-win adaptation options.

[3] http://www.bmu.de/english/climate/downloads/doc/42841.php

[4] http://onlinelibrary.wiley.com/doi/10.1111/nyas.2010.1196.issue-1/issuetoc

The New York State strategy[5] clearly identifies the need for mitigation and adaptation to be part of the same programme. An integrated assessment saw the identification of 'co-benefits' (both synergies with mitigation policy and win-wins with improving other aspects of society) as an effective way to integrate scientific research with policy requirements. One of the criteria used to judge the merits of different adaptation actions was: *Are there impacts on mitigation of greenhouse gases?*

4. Interactions between adaptation and mitigation within Scottish climate policy

This section reports on measures within the RPP (Scottish Government 2011a) and the 10 Key Behaviour Areas Set (Scottish Government 2011b) for reducing emissions and how they are likely to affect adaptation. The sector classifications below follow those of the RPP for ease of reference.

Report on Proposals and Policies

Energy Supply

There are a number of areas within the energy supply policies that may interact with climate change adaptation, both positively and negatively. The interactions discussed below all relate to the increased provision of renewable energy.

Opportunities for synergy

- The increased involvement of farmers in the supply of renewables may provide economic opportunities, increasing their resilience.
- Similarly, diversification of foresters into renewables may increase their resilience, both through the creation of additional markets as well as species diversification.
- Possible win-wins may exist with hydro-power where dams could capture excess water from more intense rainfall. This would depend on the existence of suitable channels for dealing with the excess water.
- Short-rotation crops (e.g. poplars) in flood-prone areas can produce valuable renewable primary materials and be a robust and economically important land use as well as enhancing flood control, providing they are managed appropriately, following nature conservation and flood control requirements.

Potential conflicts and trade-offs

- The often remote location of many renewable energy sources may make them vulnerable to extreme weather, potentially affecting supply.
- There may be an adverse impact of renewables (particularly hydropower) on some habitats (e.g. Pearl mussel) which may affect their ability to adapt to changes.
- Greater demand for renewable heat may lead to more felling of high nature value (HNV) woodland, affecting the adaptive capacity of woodland ecosystems.

[5] http://www.nyclimatechange.us/InterimReport.cfm

Homes and Communities

Homes and Communities offer several opportunities to address adaptation and mitigation together. In this section some general areas of synergy or conflict are highlighted as well as addressing relevant specific policies in the RPP.

Opportunities for synergy

- Shading buildings and windows, use of highly reflective roof paints and surfaces, and green roofs will keep building occupants and residents cooler while reducing the use of air conditioners, thereby lowering fossil fuel emissions from power plants. Similarly, increased urban greenspace and trees will provide cooling, improve air quality and recreation, as well as carbon sequestration.
- RPP 4.20 Housing Policy Paper – Homes fit for the 21st Century. This agenda should ideally also include provision for making homes and communities more resilient to the impacts of climate change. Such considerations could include flood resilience measures, incorporating green spaces for cooling, minimising non-permeable surfaces to avoid flooding etc.
- RPP 4.25 Domestic building standards are to be reviewed again for 2013, with the intention of improving them further for emissions reductions. This would be an ideal opportunity to ensure standards are appropriate for a changed future climate, and not based on historical climates.
- RPP 4.47 Sustainable Places – this proposal could also consider adaptation and resilience features of houses and communities.
- In general, measures such as changing standards and raising awareness for making homes more energy efficient are an ideal opportunity to include considerations for increasing their resilience to climate impacts as well.

Potential conflicts and trade-offs

- Very energy efficient homes may be difficult to cool during periods of hot weather, potentially leading to heat-related illnesses and mortality. Furthermore, increasing the airtightness of buildings may affect air-quality (forthcoming report for the Building Standards Division of the SG by BRE).
- Avoiding adverse public health impacts related to heat waves may result in increased reliance on air conditioning. This could potentially result in increased energy demand during summer peak-load conditions, although it is unlikely to become a problem in Scotland in the short term.
- Increasing the density of urban structures can help to reduce energy consumption and vehicle use, but has adverse effects on adaptation because it reinforces the urban climate effect, thereby increasing summer heat stress and hence the demand for cooling. It may also affect rainwater drainage, with implications for flooding.

Businesses and the public sector

Opportunities for synergy

- As with the previous section on domestic homes and buildings, the revision of building standards for non-domestic buildings in 2013 will be a good opportunity to ensure standards are fit for future climates. The ACEP (Assessment of Energy and Carbon Performance) regulations could be amended to include resilience and adaptation measures.

Potential conflicts and trade-offs

- The requirement to reduce emissions could either make businesses more competitive (and hence resilient), or may place a burden on them that hampers their ability to adapt successfully.
- Specific example: Water industry
  Under climate change, lower summer flows would lower the dilution of pollutants, therefore maintaining or enhancing the same standard of water treatment may conflict with mitigation targets. A strategy focusing on source protection rather than end-of-pipe solutions may be more cost-effective for both mitigation and adaptation.

Transport

Opportunities for synergy

- Some of the suggestions in the RPP for reducing transport emissions through reducing the need to travel to work may mean a reduction in workplace disruption in the case of extreme weather events.
- 'Intelligent Transport Systems' referred to in the RPP may also be an important tool in reducing disruption from weather events.

Potential conflicts and trade-offs

- The adoption of electric cars could potentially make individuals more vulnerable if the electricity supply was affected by extreme weather events

Rural Land Use

The rural land use sector is an area with potentially many synergies between adaptation and mitigation, as well as some potential conflicts to be aware of. The RPP identifies two main policies for reducing emissions from rural land use; Farming For a Better Climate (FFBC) and increased woodland creation, as well as a number of supporting and enabling measures. FFBC, as an education and advisory facility, has the potential to provide a platform for addressing climate change mitigation and adaptation together.

Opportunities for synergy

- Improving livestock health will have benefits for both mitigation and adaptation, as healthy animals will be more resilient to climate change.
- Similarly, improving soil health, and restoring peatland will improve carbon sequestration as well as improving the provision of many ecosystem-services, necessary for resilience and adaptation.
- Healthy peatland as promoted for mitigation would reduce run-off more than degraded land, reducing flood risk.
- Reductions in fertiliser application for mitigation may have beneficial effects on biodiversity, potentially increasing their resilience to climate changes.
- Developments in local food demand may reduce transport emissions as well as potentially increase the resilience of the local community through a reduced reliance on imports. However it would be necessary to ensure that alternative food sources were available in the case of local supplies being affected by climate impacts (or other shocks).

Potential conflicts and trade-offs

- Many of the measures to reduce emissions centre around improving the efficiency and productivity of farming systems (e.g. with larger animals, greater stocking density) but these more intensive systems are likely to be vulnerable to the impacts of climate change and extreme weather. Similarly, systems with greater resilience may be less efficient, and produce more emissions per unit.
- Changes in climate may encourage changes in land use and farming practices that increase emissions. Farmers may take advantage of more favourable conditions to farm more intensively, apply more fertiliser and/or potentially move into areas that previously had less intensive agriculture. Agricultural emissions may increase as a result.
- Conflicts between land-use requirements for mitigation and adaptation may arise. For example, efforts to produce renewable primary energy sources may compete with attempts to create habitat networks for migration and retreat.
- Widespread reduction in demand for red meat for carbon emission reduction could weaken the industry and reduce resilience.

Woodland Creation

Opportunities for synergy

- The policy of increased woodland creation has many potential synergies with adaptation. Planting alongside waterways and floodplains may help with erosion and flood control and increased on-farm planting can help with erosion as well as providing shade and shelter for livestock. (See also additional points in relation to afforestation for renewable energy in the energy supply section).
- New woodland planting on agricultural land diversifies forest structure and ownership, creating greater resilience.
- New afforestation allows an adjustment of the species mix, allowing changes to be made as climate changes become apparent, as well as possibly creating more diversity.
- There may be scope for new forestry plantings to create corridors to link habitats, allowing species space to move to more suitable climates.

Potential conflicts and trade-offs

- There may be a loss of moorland habitats and some herb-rich areas alongside waterways due to afforestation, which will reduce the overall resilience of species dependent on these habitats.

Waste

Opportunities for synergy

Many of the policies identified in the RPP for reducing emissions from this sector relate to reducing the amount of waste sent to landfill. This will also assist in reducing the harmful effects that flooding around landfill sites can cause such as toxic waste and debris entering watercourses.

There were no potential conflicts or trade-offs identified in the waste sector.

10 key behaviours

Within the 10 key behaviours identified by the Scottish Government, there are few areas of conflict with adaptation, and some of synergy.

- 2. Keeping the heat in: There is potential here for problems with air quality and overheating in hotter temperatures, as discussed above.
- 5. Becoming less reliant on the car: This may have potential synergies with improving resilience, as well as possibly improving urban air quality which will have health benefits particularly in a hotter climate.
- 9. Eating a healthy diet high in fruit and vegetables, locally in season where we live: This may increase resilience of local food supply, as it is not dependent on global supply and transport, which may also be affected by climate change. Conversely, if local production is adversely affected by climate change, it will be necessary to have access to other markets.

5. References

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