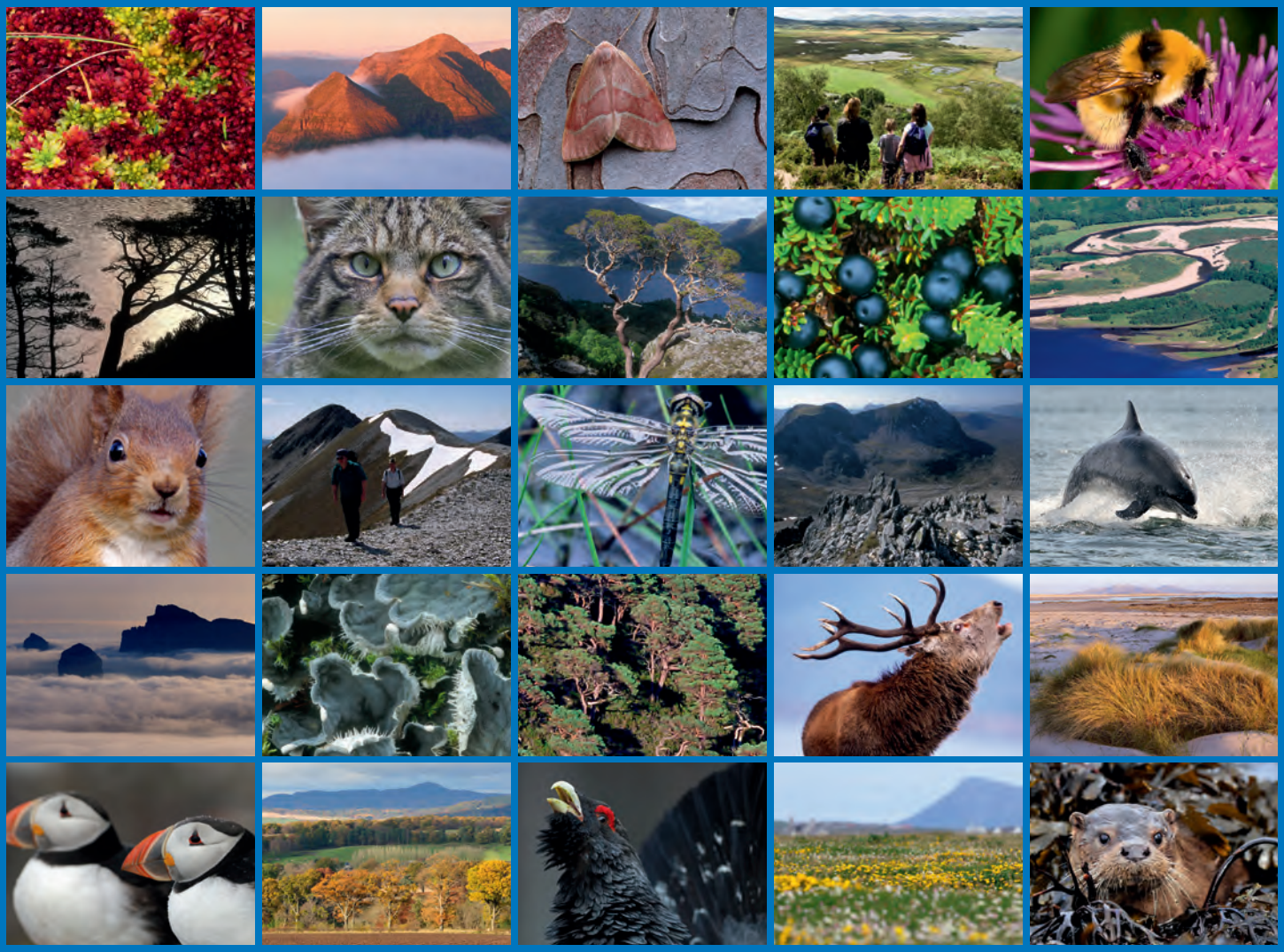
Scottish Natural Heritage
Commissioned Report No. 492

Climate change conversations



Scottish Natural Heritage
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COMMISSIONED REPORT

Commissioned Report No. 492

Climate change conversations

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This report should be quoted as:

Land Use Consultants (2011). Climate change conversations. *Scottish Natural Heritage Commissioned Report No.492.*

COMMISSIONED REPORT

Summary

Climate change conversations

Commissioned Report No. 492
Contractor: Land Use Consultants
Year of publication: 2011

Background

Climate change is widely accepted as one of the greatest challenges facing us over the coming decades. Consequences will result from the direct impacts of changing climate and sea level rise, and also from society's response to addressing its causes and the way that we adapt to the changing climate in planned and unplanned ways. Many of these can have implications for Scotland's landscapes and could alter the character of the landscape, the way in which it is perceived and enjoyed, and its contribution to our quality of life.

This report focuses on ways of exploring the effects of climate change on landscape and quality of life at a local level. This extends to helping communities make informed choices about how they want these changes managed. To do this a community dialogue exercise was ran with two pilot communities. This involved between 20 and 25 members of each community participating in a series of meetings to discuss what they valued about their place, the ecosystem services their area delivered and how this could be affected by climate change. The discussions also started to identify the preferred responses to these impacts.

Main Findings

The work has shown that considering climate change through its effects on the local landscape and quality of life provides a useful methodology for communities. The work has also shown that there is potential to use the concept of ecosystem services to explore the reasons why the local landscape is valued and to assess the likely implications of climate change.

In both pilot communities there was:

- a recognition that climate change is likely to result in significant change across the area and that it will not be possible to prevent this;
- concern that the focus should be on managing this change to retain or, where it may be lost, record what is important and distinctive about the area;
- understanding there will be some tensions, trade-offs and compromises, and there may be competing pressures for land from agriculture, habitats, flood protection, sea level change and renewables; and
- a general preference for smaller scale and diverse approaches to carbon reduction which could fit better with the local area's resources and character rather than large scale wind farm development.

CONTENTS

Appendices are available on the SNH website

Acknowledgements
The project team would like to acknowledge the guidance provided by the project steering group, the assistance of Machars Action, Nairn Community Centre and the Nairn Partnership in organising the climate change conversations and, most of all, the Machars and Nairn Climate Change Panels for their constructive input to the work.

1 EXECUTIVE SUMMARY

Land Use Consultants (LUC) and the Small Town and Rural Development Group (STAR) were commissioned by Scottish Natural Heritage (SNH) and Sciencewise-ERC[1] to work with communities to explore the implications of climate change and some of the choices that decision makers will face over the coming decades.

The project involved:

- developing the concept of ecosystem services associated with landscape character and landscape qualities;
- developing a method which can more effectively measure and capture the effects of landscape change on ecosystem services as a means of judging the impacts on quality of life;
- developing a process which can be used with communities and other stakeholders to identify 'landscape' ecosystem services and measure the effects of landscape change;
- trial this approach with two communities with specific reference to climate related landscape change, using this to gauge people's perceptions of these changes, and the community and policy actions that they consider should be taken forward to address them.

The work led on from previous research carried out by LUC for SNH into climate related landscape change and the implications for quality of life[2].

Ecosystem services

The study focused on 'cultural ecosystem services' based on the headings of sense of history, spiritual, learning, recreation, calm, sense of place, inspiration and escapism. A limited number of provisioning services (covering food, fuel etc) and regulating services (flood management and air quality) were also included. This list of ecosystem services was refined, grouped and re-ordered (from practical to less tangible). For each, examples of benefits were provided to illustrate the approach.

Community selection

The short listing of pilot communities was based on consideration of three main factors:

- Existing landscape character;
- Patterns of possible climate related landscape change;
- An initial understanding of different communities' suitability for a Climate Change Panel exercise.

After discussion with the Steering Group, Nairn in Highland and the Machars in Dumfries and Galloway were selected as the two communities that would be asked to participate in the study.

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[1] The Sciencewise Expert Resource Centre (ERC) funded by the Department for Business, Innovation and Skills (BIS), helps policy makers commission and use public dialogue to inform policy decisions in emerging areas of science and technology. It consists of a comprehensive online resource of information, advice and guidance together with a wide range of support services aimed at policy makers and all the different stakeholders involved in science and technology policy making, including the public. The Sciencewise- ERC also provides co-funding to Government departments and agencies to develop and commission public dialogue activities.

[2] http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-research-and-projects/climate-change-landscape/

With the assistance of local host organisations, 'Climate Change Panels' were established in both communities. The aim was to invite a representative cross section of local people based on gender, age, geography, interest and organisation. Incentives in the form of travel expenses, a raffled hamper of local produce and refreshments acknowledged people's involvement in the process.

Workshop design

Workshop design was developed by the consultant team and refined in discussion with the project steering group. It was agreed to break the exercise down into three sessions, reflecting the amount and complexity of information to be covered. The aims of the three sessions were as follows:

- To explore people's understanding of their local landscape, and the ways in which it contributes to their quality of life;
- To increase understanding of climate change and its implications for the places, features and qualities identified as being of importance in the first session;
- To explore choices, trade-offs and priorities in the way that the local area adapts to climate change and contributes to carbon reduction targets.

The workshop discussions were designed to include:

- information for participants – presentation, handouts, posters, photos;
- opportunities for group discussion;
- table based discussions with materials for recording;
- analysis and feedback linking the three sessions.

The meetings were held over six weeks in September and October 2010.

Findings

There was value in asking each Climate Change Panel (CCP) to confirm or refine the 'study area'. While the Machars CCP was content with the proposed study area, in Nairn the boundary was redrawn to coincide with the historic county of Nairnshire.

Both Climate Change Panels found it relatively straightforward to identify aspects of the local landscape that they considered important. In both places, this comprised a mix of areas, specific places or buildings and qualities. The conclusions reached by the two panels were broadly comparable with information from the relevant landscape character assessments.

In the Machars there was a broad spread of features including beaches, Christian heritage sites, lochs, Wigtown Bay local Nature Reserve, a range of recreation sites and qualities including views, peace and quiet and remoteness.

In Nairn, there was strong agreement around a short list of landscape features including beaches, golf course, Culbin Sands, Cawdor Estate and woods, Rivers Nairn and Findhorn and historic built environment of Nairn itself.

The Panels were asked to use the framework of ecosystem services (described as 'benefits') to record the reasons why these aspects of the local landscape were judged to be important. This process worked well, with people citing a broad range of benefits, including some of the more ephemeral cultural ecosystem services such as escapism and spirituality. On the other hand, some of the more technical services (e.g. water regulation) were less well understood and highlighted less frequently as a result.

The Machars area was most strongly valued in terms of:

- recreation, tourism, education and wildlife;
- peace and quiet, inspiration and escapism;
- sense of place, sense of history and spiritual values.

The Nairn Panel identified a broad range of benefits but with lower importance attached to spiritual values, freshwater, fuel, water and climate regulation.

The Panels considered the effects of climate change on these features and the ecosystem services they provide. In the Machars, the Panel's views suggested that climate change could result in:

- major negative effects on sense of place;
- medium negative effects on wildlife, recreation peace and quiet, inspiration, escapism, sense of history, spiritual values and tourism;
- minor negative effects on the provision of food/timber and freshwater;
- minor positive or neutral effects on fuel, water regulation and climate regulation.

In Nairn, the Panel's views suggested that climate change could result in:

- an increase in recreation, learning and fuel benefits;
- a mix of decreased and increased wildlife, food and timber, freshwater, water regulation and climate regulation benefits;
- a decrease in tourism, peace and quiet, sense of place and sense of history benefits;
- little or no effect on inspiration, escapism or spiritual benefits.

It is likely that effects on some of the more technical types of benefit (climate regulation) were underrepresented. There was, however, a very clear message from both Panels that they consider that climate change could have a major and negative effect on sense of place and a range of the other important benefits that people derive from the local landscape.

In the third session, the focus of the discussions turned to the choices and trade-offs that decision makers have in considering how to address the issues (positive and negative) identified by the Panels during the second sessions.

The Machars Panel made the following recommendations:

Sea level rise

- Focus expenditure where threats / benefits greatest
- Avoid new development in areas that may be at risk of flooding in the future
- Carry out flood defence works for Isle of Whithorn, Port William, Newton Stewart and Garlieston, but elsewhere explore opportunities for managed realignment, with new wetland creation
- Accept some loss of historic sites but ensure they are properly recorded before they are lost
- Manage road system to reflect loss of some sections of coast road.

Flooding along rivers and burns

- Manage mosses and woodland to retain water
- Develop floodplain flood management measures along the River Bladnoch linked to water storage and small scale hydro

Agriculture

- Plan for agricultural intensification in order to retain key landscape features
- Managed realignment to reflect presence of better quality agricultural land
- Sensitive design and location of new sheds for overwintering of cattle indoors
- Provide information and advice for farmers

Habitats

- Managed realignment along the coast to retain important habitats
- Careful choice of new trees and woodland
- Sensitive management of peat and rivers
- Restoration of river floodplains and other habitats
- Co-ordinated approach with good information

Recreation and tourism

- Develop opportunities for informal recreation
- Local businesses to market the area in terms of its local character
- Aim to minimise impacts of wind energy development on tourism areas
- Balance impacts of tourism on local communities and land management

Historic environment

- Recognise some historic sites will be lost, and place an emphasis on recording as a basis for interpretation and promotion for tourism

Forests and woodlands

- Raise awareness of land owners to the importance of managing and maintaining existing small woodlands and shelter belts
- Consolidate and reinforce existing woodlands in preference to new large scale planting in the area
- Promote the importance of monkey puzzle trees at Monreith House

Climate change mitigation

- Reduce energy consumption
- Promote local wood fuel production
- Woodland expansion
- Mix of renewable energy technologies including small wind turbines, wood fuel, and solar energy.

The Nairn Panel made the following recommendations:

Sea level rise and storm surges

- Improved flood defences for the town itself, linked to restoration of natural flood areas
- Managed realignment linked to habitat creation at Culbin Sands
- Sacrifice some coastal recreation sites in order to protect others
- Encourage greater use of harbour and relocated boat yard

Flooding along rivers and burns

- Dredging along lower section of the river
- Restore natural flood plains to hold flood water
- Manage and stabilise river banks
- Reduce agricultural water abstraction during the summer to reduce low flow

Agriculture

- Water storage (winter) and irrigation (summer)
- Measures to reduce soil erosion by wind
- Maintain field boundaries
- Assess implications of new crops for water management
- Advice and information for farmers

Recreation and tourism

- Development of a wider range of outdoor recreation opportunities
- Maintain quality of beaches (water treatment)

Forests and woodlands

- Replace and replant trees
- Develop commercial hardwoods
- New riparian planting
- Native woodland expansion

Climate change mitigation

- Maximise production and use of biomass
- Manage peatland to store CO2
- Wider use of public transport
- Micro renewables in all new development
- Anaerobic digestion for dairy farms
- Tidal energy (subject to environmental impacts)
- Mixed views on wind energy development with some very negative and others indicating that some well placed wind farms will be needed.

Following the third session, the project team analysed the Panel Recommendations in terms of the potential linkages with the existing policy framework.

Development of the methodology and its potential use

The project showed that considering climate change through its effects on the local landscape and quality of life provides a useful methodology for communities. The approach has the potential to enable people to discuss this important topic and to make decisions about what it is important for them and others to do to respond and prepare for change.

The project has also shown that there is potential to use the concept of ecosystem services to explore the reasons why the local landscape is valued and to assess the likely implications of climate change.

The report identifies a number of ways in which the methodology could be refined and improved. It also notes the potential to create a toolkit which communities could use to explore the effects of climate change on their local area.

The report also describes a number of ways in which the findings could be used to inform policy at community, local authority and national levels, complement published Landscape Character Assessments and guide landscape planning and management.

2 INTRODUCTION

Land Use Consultants (LUC) and the Small Town and Rural Development Group (STAR) were commissioned by Scottish Natural Heritage (SNH) and Sciencewise-ERC[3] to work with communities to explore the implications of climate change and some of the choices that decision makers will face over the coming decades. The work led on from previous research carried out by LUC for SNH into climate related landscape change and the implications for quality of life[4].

The work focused around 'climate conversations' with two 'climate change panels' – one in the Machars area in Dumfries and Galloway, the other in Nairn in Highland. The meetings were held over six weeks in September and October 2010.

This draft report describes:

- The aims and objectives of the study;
- Ecosystem services;
- The process of community and participant selection;
- The design of the 'climate conversation' process;
- The Machars Climate Conversation;
- The Nairn Climate Conversation;
- Conclusions and recommendations.

Study Purpose

The study brief defined the purpose of the research as follows:

- To further explore, with selected communities, ways of assessing the effects of climate change on landscape and quality of life at a local level. This extends to helping communities make informed choices about how they want these changes managed.

In developing the approach to the work, the team identified the following components:

- developing the concept of ecosystem services associated with landscape character and landscape qualities (without reference to landscape change or the specific effects linked to climate change);
- developing a method which can more effectively measure and capture the effects of landscape change on ecosystem services as a means of judging the impacts on quality of life;
- developing a process which can be used with communities and other stakeholders to identify 'landscape' ecosystem services and measure the effects of landscape change;

[3] The Sciencewise Expert Resource Centre (ERC) funded by the Department for Business, Innovation and Skills (BIS), helps policy makers commission and use public dialogue to inform policy decisions in emerging areas of science and technology. It consists of a comprehensive online resource of information, advice and guidance together with a wide range of support services aimed at policy makers and all the different stakeholders involved in science and technology policy making, including the public. The Sciencewise- ERC also provides co-funding to Government departments and agencies to develop and commission public dialogue activities.

[4] http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-research-and-projects/climate-change-landscape/

- trial this approach with a community with specific reference to climate related landscape change, using this to gauge people's perceptions of these changes, and the community and policy actions that they consider should be taken forward to address them.

This report sets out the results of this approach.

The project team would like to acknowledge members of the Machars and Nairn Climate Change Panels for their contribution to the project.

3 ECOSYSTEM SERVICES

This part of the report outlines the framework of ecosystem services which was used to explore the contribution of local landscapes to communities' quality of life, and to judge the potential effects of climate change.

Phase 1 of the research used an adapted set of 'cultural ecosystem services', based on the headings of:

- inspiration and enrichment;
- health and well being;
- aesthetic values;
- sense of place;
- cultural heritage values;
- recreation and tourism.

Within the first phase of the research, these headings were used to develop a qualitative description of the landscape's current contribution to quality of life, and by describing how each type of service could be affected by climate change, a description of the implications of climate related landscape change. This was an initial attempt at this kind of analysis and it was recognised that the second phase of the work provided an opportunity to develop and apply it at the level of individual communities.

The first task was to review and develop the range of ecosystem services linked to landscape character and quality. There were two aspects to this. The first relates to the range of cultural ecosystem services covered by this approach. The second relates to the potential to include other types of ecosystem services linked to the landscape, particularly where these could be affected by climate change (or mitigation / adaptation) and where they are likely to be considered relevant by local communities.

Taking the first of these, the work drew on research undertaken by LUC (with partners Research Box and Rick Minter) for Natural England into '*capturing the cultural services and experiential qualities of landscape*'[5]. The research aimed to improve understanding of the way in which 'landscapes provide a range of services which contribute to people's quality of life including spiritual enrichment, cognitive development, reflection, recreation and aesthetic enjoyment'. The work included 12 public focus groups, four extended 'creativity sessions' and 16 'post experience in-depth interviews' and defined eight types of cultural ecosystem service. While most of the categories of ecosystem were broadly comparable to those used in Phase 1 of the SNH research, it was notable that a direct link to 'health and wellbeing' was absent from this list. Our experience from Phase 1 was that the health and wellbeing ecosystem services are quite difficult to define, tending to overlap with recreation (physical health) or enrichment (mental health). In reflecting on the range of services explored in the Natural England research, we concluded that health and well being may represent an intermediate step between all of the landscape related ecosystem services and 'quality of life', being influenced to a greater or lesser extent by all these factors.

[5] http://naturalengland.etraderstores.com/NaturalEnglandShop/product.aspx?ProductID=d7500968-c041-4600-8bcc-473968cfe244

The Natural England work identified the following types of cultural ecosystem service:

- Sense of history
- Spiritual
- Learning
- Recreation
- Calm
- Sense of place
- Inspiration
- Escapism

It was agreed that we would also include a limited number of other types of ecosystem services in any of the following situations: where they are strongly linked to landscape character; where they are likely to be affected by climate change impacts; mitigation or adaptation; and where they are relevant to quality of life. Specific examples include:

- provisioning services: for example food, mineral, fuel and water supply.
- regulating services: for example flood management and soil and slope stability.

In discussion with the project steering group, this list of ecosystem services was refined, grouped and re-ordered (from practical to less tangible). For each, examples of benefits were provided to illustrate the approach.

The finalised list of ecosystem services is presented in Table 2.1.

Table 2.1 : Finalised list of ecosystem services with examples of benefits

Ecosystem service	Examples of benefits associated with each ecosystem service
Recreation	Walking, riding, cycling – routes and areas.
Tourism	Visitor activity, attractions, part of the way the area is promoted or portrayed
Learning	Formal and informal source of education about the natural and cultural heritage
Wildlife	Presence and awareness of important plants and animals
Food and timber	Cultivated crops, farmed sheep and cattle, game and wild food, timber
Freshwater	Source of drinking water
Fuel	Wood, peat, hydro, wind
Calm	Restorative benefits e.g. from woodland, or as a result of perceived remoteness

Inspiration	Resulting from beauty, drama, wild, romantic or powerful character of the landscape – can be individual or related to arts and literature
Escapism	Influence of remoteness, and escape from stress or reversion to childhood
Sense of place	Distinctive landscape contributing to identity of area or community
Sense of history	Permanence of natural landscape, evidence of history of human activity
Spiritual values	Religious or non-religious – character of the landscape, specific features or buildings etc.
Water regulation	Storing water, accommodating floodwater
Climate regulation	Storing carbon in soils and vegetation, providing shelter

4 COMMUNITY AND PARTICIPANT SELECTION

Community selection

The short listing of pilot communities was based on consideration of three main factors:

- existing landscape character;
- patterns of possible climate related landscape change;
- an initial understanding of different communities' suitability for a Climate Change Panel exercise.

The pilot communities will ideally have some community capacity already, as evidenced by a community development trust or other forms of active community organisation. This would enable them to be a strong partner in the consultation process and make it more likely that they would be able to pick up on the issues raised at a local level following on from the Climate Change Panel meetings. In particular we hoped that they would be able to work with us to help organise and provide a local 'host' for the meetings.

We reflected on the merits of involving communities (e.g. those in National Parks) who have been subject to extensive consultation over recent years, and concluded that it might be better to avoid these for the time being.

Similarly, we considered the potential to focus on one community within the 'post industrial' landscapes of central Scotland, but concluded it would be better to establish the methodology in more straightforward contexts before focusing in areas where 'landscape' may be someway down the list of priorities.

Shortlisted locations and a brief commentary on their suitability are set out in Table 3.1:

Table 3.2: Shortlisted locations

	Landscape	Climate	Community
Nairn	Firth and coast Intensive arable Conifer forests Moorland hills Settled	Sea level rise Winter flooding Agricultural intensification Summer drought Forest management	Work through Nairn Partnership and the Nairn Community Centre
Montrose	Coast and basin Intensive arable Settled	Sea level rise Winter flooding Agricultural intensification	Identified as alternative to Nairn, no further contact made

	Landscape	Climate	Community
Aberfeldy	Highland strath Mountains Forests and moor Settled	Flooding – Tay catchment Upland habitats Renewable energy Farming change	Potentially large area Overlap / confusion with other initiatives
Machars	Coast and outer firth Drumlins Mosses and forest Pastoral Settled	Sea level rise Winter rainfall and summer drought Recreation and tourism Agricultural and forestry change	Strong and established community organisation able and willing to assist
Laurencekirk	Arable agriculture and horticulture Forest and moorland on foothills Settled and productive	Agricultural intensification Forest management Summer drought Forest management Moorland management	Strong and established community organisation able and willing to assist

Discussions were also held with communities in Blair Atholl and Strathmore (Blairgowrie and surrounding area) in Perthshire, and Tarbert in Argyll.

After considerable discussion with the Steering Group, Nairn and the Machars were identified as the preferred communities to work with, with Laurencekirk as a possible east coast alternative to Nairn.

Of the communities not selected, Laurencekirk was keen to participate but did not represent the breadth of landscape and potential climate change impacts that was needed, duplicating some of the issues in Nairn and the Machars. Blair Atholl did not have sufficient capacity and were engaged in other issues that did not give community representatives time to participate. Aberfeldy wanted to consider the proposal to participate through a number of local democratic structures meaning that process would not have fitted within the project's short timescale. A community in Strathmore expressed some interest but also had a major walking festival to organise within the same timescale.

Participant selection

STAR worked with the Nairn and the Machars communities to set up the Climate Change Panel Meetings and to identify and invite a good cross section of the community to the meetings (three evening meetings each set a week apart).

Machars had a host organisation (Machars Action) that was prepared to work with us to host the meetings and recruit participants. STAR had a previous relationship with Machars Action and was able to work with them to organise the meetings within a very short timescale. For this reason Machars was chosen as the first community to participate.

The community in Nairn were open to the meetings taking place, thought they might be relevant, and were not insistent on the proposal to participate being put to local democratic mechanisms before agreeing to be involved. They also had two organisations – the Nairn Partnership, and the Nairn Community and Arts Centre that were willing to help spread the word and identify potential participants.

The target audience was agreed at around 20 people and the intention was that the same 20 people would attend all three meetings – providing continuity in terms of the issues raised and developed through the Panel discussions.

The aim was to invite a representative cross section based on:

- Demography – male/female; good age range
- Geography – people from different villages and rural settlements from within the area
- Interest – to include land managers, recreation, heritage, culture, environment, tourism, business and community interests
- Organisational Representation – to make sure that key community development organisations e.g. community councils were invited.

The process of identifying and organising community based consultation can be lengthy, particularly where the subject of the consultation is 'imposed' from outside, does not relate to a specific local issue and where no formal payment is offered (as would be the case for traditional market research). Given the need to minimise the lead in time whilst achieving acceptable levels of participations, it was critical for STAR to work with local community organisations.

This was easier to organise in the Machars where STAR have had a long term working relationship with the community and much of the task of identifying people has been taken on by Machars Action – the local community development organisation.

In Nairn STAR sought the assistance of the Nairn Partnership and the Nairn Community Centre, supplemented by extensive direct contact.

Incentives

While payment of workshop participants was not possible, it was agreed to pay reasonable travel expenses associated with attendance at each series of three meetings and to raffle a hamper of local produce at the end of each session. In the Machars, soup and sandwiches were provided before the meeting, recognising that participants travelled to the venue from the surrounding area making it otherwise difficult to eat and attend the panel meetings. These measures provided a recognition and acknowledgement of people's involvement in the process.

5 WORKSHOP DESIGN

This part of the report describes the methodology that was developed for the two community conversations, based around series of three workshops. The design drew on experience of approaches to community engagement together with knowledge of landscape, climate change projections and potential impacts.

Figure 4.1 provides an overview of the engagement process.

Workshop design was developed by the consultant team and refined in discussion with the project steering group. From the outset it was recognised that the process would be covering a lot of ground with participants, so it was decided to break it down into three main stages, each to be tackled in a separate meeting:

1. The local landscape and why it is important.
2. Past and future climate change and how it could affect the local landscape.
3. Choices and trade offs in the way we respond to climate change.

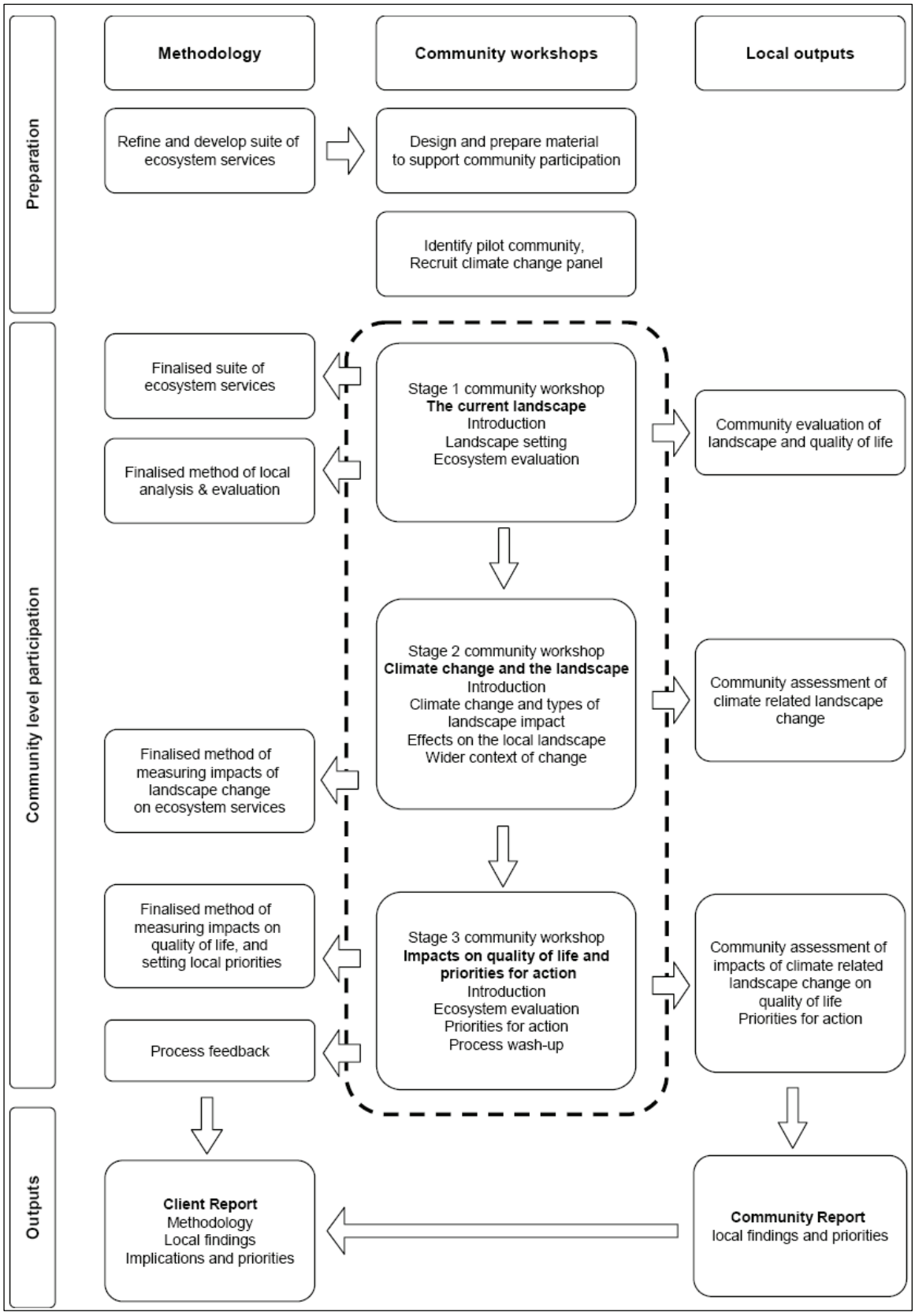
The workshop discussions were designed to include:

- Information for participants – presentation, handouts, posters, photos;
- Opportunities for group discussion;
- Table based discussions with materials for recording;
- Analysis and feedback linking the three sessions.

The workshops were designed to allow a two way flow of information, balancing and combining ‘presentational’ information with the views, values and opinions of participants.

A more detailed description of each of the three sessions is set out below. A copy of the presentation for each session is contained in Appendix 1.

Figure 4.1: Overview of engagement process



Session 1: Your Landscape.

The aim of the first session was to explore people's understanding of their local landscape, and the ways in which it contributes to their quality of life.

The process was as follows:

- Introduction and welcome to the Climate Change Panel. Brief overview of the process, key steps and overall objectives (informing decision making);
- Agreeing the 'study' area – based on initial proposal from the consultants, informed by local views. The agreed area provided the focus for subsequent discussion.
- The local landscape: During this table based discussion (4-5 people per table) participants identified places, features or qualities which make the area distinctive or which are considered particularly special or important. A worked example was used to illustrate the approach. Proformas were provided to record this information. Each table provided feedback to the wider group.
- Consultants then provided an overview of the area based on SNH Landscape Character Assessment, a map showing landscape character types and a summary of key characteristics and qualities. Participants were asked whether the descriptions rang true, and were able to add anything more to their lists of important places, features and qualities.
- Introduction to Ecosystem Services – based on a simplified suite of 'benefits' that we get from the landscape to provide a framework for participants to consider why the landscape is important to them. Participants were asked to consider whether there were any other ways in which the landscape contributes to their quality of life;
- Why the landscape is important – table based discussion identifying the benefits associated with each of the places, features and qualities identified in the first part of the session. A worked example was used to illustrate the approach. Pro formas were provided to record this information.
- Short taster for the next session – climate change and what it could mean for the local landscape. Participants were provided with a handout summarising climate change and landscape effects, as a primer for the following week's discussions.

Materials and support for the first session included:

- Wall displays – map of the area (1:25k base), topic area maps (woodland, historic environment, landscape character etc);
- Handouts showing ecosystem service categories (benefits) and explanation;
- Pro formas and maps for tables to record important places, features and qualities;
- Pro formas to record benefits associated with each identified place, feature and quality;
- A summary handout covering climate change and its possible landscape implications.

Session 2: Climate change

The aim of the second session was to increase understanding of climate change and its implications for the local landscape. This was used to inform a discussion around the effects on the places, features and qualities identified as being of importance in the first session.

The process was as follows:

- Introduction and welcome
  - A recap from the first session based on analysis and synthesis of results from session one. This confirmed the important places, features and qualities, mapped out the pattern of benefits (highlighting the 'most valued' assets and the most prominent types of benefit) and synthesising them into a number of themes to carry forward into the subsequent discussion.
  - Introduction to climate change and a brief review of past change within the local area, followed by an open discussion to identify ways in which people think the climate has already changed.
  - Introduction to climate change projections – focusing on key changes including precipitation, temperature and sea level. An introduction to the ways in which these could affect the local landscape, linking to the handout provided at the end of session one. Phase 1 photomontages and annotated photos of the local area were used to illustrate this part of the presentation and clarify the difference between direct, mitigation and adaptation effects;
  - Table based discussions exploring the potential effects of climate change on the local landscape. Each table was given a number of the themes identified from the first meeting and asked to consider how each could be affected by climate change, and what the implications could be for quality of life. Wall posters provided additional reference information for topics such as flooding and sea level rise.
  - Feedback and group discussion – how will the local landscape be affected by the changing climate? How does this change compare with the changes that have taken place in the last 20 or 30 years?

Materials and support for the second session included:

- Wall displays – map of the area (1:25k base), topic area maps (woodland, historic environment, landscape character etc), flooding and coastal elevation maps;
- Handouts showing ecosystem service categories (benefits) and explanation;
- Pro formas and maps for tables to record the effects of climate change on important places, features and qualities (grouped thematically) and the implications for quality of life (benefits).

Session 3: Action.

The aim of the third and final session was to explore the choices and trade-offs that will be necessary in the way that the local area adapts to climate change and contributes to carbon reduction targets, and to use this information to define and prioritise actions. In addition to the members of the Climate Change Panel, a number of external 'experts' were invited to attend this session to provide information and advice, and to hear the views and priorities of the Panel. These 'experts' included representatives from the client organisations and respective local authorities.

The process was as follows:

- A summary of the findings from the first and second sessions to act as a reminder for participants and an introduction for 'experts'. This identified the main drivers for change (e.g. sea level rise or agricultural change) and the key implications for quality of life (e.g. sense of place benefits).
- A short presentation on the policy choices and trade-offs under a series of topic headings (e.g. flooding, historic environment, recreation and tourism) – illustrating different approaches and what they could mean for the local area.
- Each table was given three policy areas to discuss – with handouts summarising the issue, the implications for the local area and the options in terms of adaptation responses. Participants were asked to discuss these options and decide which approach they would favour for their local area. People were encouraged to take a realistic approach, recognising financial and practical constraints.
- Group feedback and discussion on the priorities for action.
- A short presentation on climate change mitigation setting out national targets, what this means in the local context and the potential contribution of different types of climate mitigation (renewables, woodland expansion, peatland restoration etc)
- Table based discussions on the most appropriate approach to climate change mitigation for the local area.
- Short feedback to the wider group.
- Wash up – how did the process go, what worked, what did not, how could it be improved?
- Conclusion and thanks

Materials and support for the third session included:

- Wall displays – map of the area (1:25k base), topic area maps (woodland, historic environment, landscape character etc), flooding and coastal elevation maps;
- Handouts summarising the policy issues, the implications for the local area and the options in terms of adaptation and mitigation responses;
- Pro formas and maps for tables to record priorities for climate change adaptation and mitigation;
- Feedback form.

Methodological findings and Recommendations

The methodology developed for the climate change conversations drew on experience of community engagement and facilitation, landscape, ecosystem service and climate change expertise. This part of the report reflects on the methodology under the following headings:

- Designing and organising the meetings
- Identifying target communities and seeking their participation
- Working with them to identify a cross section of local people

Designing the meetings

A key challenge from the outset was to develop a way of communicating large amounts of potentially complex information, helping participants think about their area and its future in a different way, and establishing a dialogue which reflected people's knowledge and appreciation of their local area.

The exercise was broken down into three, two hour sessions to prevent 'information overload' and to provide enough time to discuss each element. This was helpful, providing a clear focus for each session, but meaning that the meat of the exercise (climate change) was not fully introduced until the second meeting. While the team considered that limiting each session to two hours was important to avoid overloading participants, in the event there might have been some benefit in allowing more time for discussion.

Alternatives which were considered but rejected included running the sessions as a single event over the course of a day, or an evening and full day. Spreading the events over three sessions was judged most likely to secure sign-up from participants.

The following sections review each session, its content and consider how they might be improved.

Meeting 1: Our Landscape and the Benefits we derive from it

A session where participants could define their area, identify its main landscape features and think through the benefits they derive from these features (using ecosystem services tools).

- Method/Lay out: Small group tables with 4-5 people sitting at 4 tables. The meeting unfolded as a mix of presentation, group work using tools provided, feedback, and general discussion.
- Tools: Maps of the area; Sheets to record landscape features and a short description of each; Worksheets to record the landscape feature and the ecosystem services that derive from it.
- Presentation material: Introduction to the study; our view of the area; experts view of landscape character; introduction to Ecosystem Services, outline of the next session.
- Discussions: How would we define the area? What are the landscape features that we have identified? How has the landscape changed in the past? What benefits do we derive from the landscape features?

Lessons learnt

Defining the landscape features: This part of the session worked well and was simply done.

Attributing benefits to the landscape features: This part was maybe a little bit onerous as it required participants to take each landscape feature they had identified and attribute the ecosystem services that they derive from it. On reflection we would redesign this to see whether we could make it more fun and engaging rather than a 'task' that had to be completed. Having said that, the framework of ecosystem services, presented in terms of the benefits we get from the landscape, appeared to work well, with people quickly understanding and applying the approach. Participants worked through the task well, were quick to think in terms of 'benefits' derived from the landscape, and were able to work through the sheets that were provided.

Some of the more technical services were highlighted less frequently. This was not altogether unexpected given the complexity of issues around carbon storage or flood regulation. While the presentations provided some explanation of these services, there was insufficient time to explore the way in which the local areas contributed such benefits. An alternative might have been to provide this kind of information, perhaps in mapped information, though this would have required additional technical preparation ahead of the meetings and would have required participants to take the results at face value, rather than providing their own interpretation.

On the other hand, people were willing to draw out some of the more qualitative or ephemeral services such as 'sense of place' or 'inspiration', in some cases providing quite personal views and opinions.

We also think that not introducing much on climate change at this first meeting meant that we were asking participants to trust the process when they were just starting to experience it. On participant said that it felt that in the first session they were being asked to write a tourism brochure rather than discuss the effects of climate change.

In the case of Nairn, there was strong agreement on a core set of landscape features across the five table discussions, together with a longer list of features identified by individual tables. When it came to the second part of the first session, several tables evaluated the same features. There might have been some merit in allocating the longer list of features between the tables to ensure that the evaluation was more comprehensive. On the other hand, the concentration on a limited number of features did confirm the importance of these to panel participants.

Table based discussions to identify important landscape features were followed by a brief feedback session, and a short presentation based on the relevant Landscape Character Assessment to identify any key differences or omissions. If there had been more time, there would have been value in participants reviewing the landscape character types and areas and key characteristics identified by the LCA to decide whether additional aspects should be added to their list of important landscape features.

Meeting 2: Climate Change and its effects on landscape and quality of life

A session where participants were introduced to climate changes in the past 30- 40 years and the best science on the likely changes over the next 50 years. Participants then considered how these changes would affect their landscape and the benefits that derive from it – using their work from the previous meeting.

- Method/Lay out: Small group tables with 4-5 people sitting at 4 tables. The meeting unfolded as a mix of presentation, group work using tools provided, feedback, and general discussion.
- Tools: Worksheets to record how they saw climate change affecting the landscape and then the benefits.
- Presentation material: Presentation of findings from the first meeting; Climate change in the past; Future likely climate change;
- Discussions: Is the feedback from last week right/ is there anything we missed?; Does the climate change presentation on past changes resonate with what people have experienced here? Feedback on the changes that each group identified to the landscape/benefits.

Lessons learnt

Presentation on climate change: There was good feedback on the simplicity and clarity of how this complex subject was presented.

Small Group work to identify changes to landscape/ benefits: Again participants worked through this well with the materials provided, but our own assessment is that we should look at the tools/materials again and see whether they can be made more interactive and more engaging rather than a task to be worked through.

One potential solution would be to bring the Climate Change information into the first session and to have a second session around Benefits which identifies benefits and then how they would be affected by climate change. This would bring all the work on benefits/ecosystem services into one session rather than spreading it over two. We could then look at ways of designing a more interactive 'game' that involves people attributing benefits to landscape and then either adding or subtracting them in light of potential climate change.

The group work during the second session required people to think about three issues – the key climate change variables, the potential effects of climate change on valued landscape elements and the implications of this for quality of life as represented by ecosystem services. Although different ways of recording this information were used in the second session in each location, most of the discussion focused on climate change and impacts on landscape features, with less focus on impacts on ecosystem services. This may reflect the complex nature of this part of the exercise, but could be addressed by more tightly facilitating or chairing each session. The alternative is that the facilitators assess the effects of climate related landscape change on ecosystem services between sessions 2 and 3 rather than asking participants to do this themselves. This is effectively what happened in the Machars, meaning the discussion of ecosystem services in the third meeting was more complete, but based on the project team's interpretation of the findings from the second meeting, rather than the view of participants.

A further issue to consider is the importance of relating 'generic' landscape and climate change issues to the local context, through the use of photographs (annotated as appropriate) and local examples. This needs to provide a balance between providing prompts and examples, and avoiding steering panel members too closely. The use of worked examples from another part of Scotland helped in this respect

Meeting 3: Action, Choices and Trade-Offs

A session where participants could reflect on the best way to address changes that have been identified in the previous session.

- Method/Lay out: Small group tables with 4-5 people sitting at 4 tables. The meeting unfolded as a mix of presentation, group work using tools provided, feedback, and general discussion.
- Tools: Worksheet to allow groups to discuss and record their views on what action should be taken to address the effects of climate change on key features.
- Presentation material: Feedback from the previous session; presentation on the options for action looking at likely direct impacts and the scope for adaptation; presentation on need for mitigation and the options for action.
- Discussions: Feedback on options and priorities for adaptation; Discussion on options and priorities for mitigation.

Lessons learnt

Overall this meeting was tight for time and tended to over run. It either needs to be planned as a longer meeting from the outset; or broken up into two – one meeting focused on adaptation and one on mitigation and next steps. This would then require a fourth meeting which would potentially stretch the good will of participants. Alternatively, the third session could be made longer and split into two halves with a break in the middle.

Presentation: The presentational material again worked well but it would be worth considering whether it could be split up.

Adaptation Choices and Trade Offs: We changed the worksheets used for this, learning from the experience in the Machars (the first community). The main change was to more strongly identify the landscape features that would be affected. However in both discussions participants were willing and able to adopt a realistic view of what should happen (rather than opting for a 'no change' stance), identifying solutions that were locally appropriate, would make best use of local resources, be most appropriate within the landscape and would as far as possible maintain the benefits that had been identified during the first session. So there was a sense that participants had 'journeyed' through the process.

While the value of the panel recommendations in each location should not be underestimated, there is an obvious further step in moderating and co-ordinating recommendations. This would help ensure that recommendations do not conflict with one another, are practical and achieve their objectives. This could be achieved by ensuring greater 'expert' participation and facilitation in the final session (potentially diluting the community dimension of the work), or by holding a fourth 'feedback' session where the processed findings and recommendations are fed back to participants (as outlined above).

Mitigation: This discussion tended to be squeezed because of time constraints meaning there was little time for proper reflection of the issues and choices and consideration of the next steps. While it was clear that there were some strong differences of opinion between a number of participants, many were more willing to strike a balance suggesting that a mix of options was required, rather than a strong reliance on wind energy. A longer session would have provided more time to explore these different positions.

Identifying target communities

The process of identifying potential communities for the study is described in some detail in section 3 of this report, above. This section therefore focuses on the methodological issues encountered and lessons learnt. The timescale for the work was very short and would not comply with good practice in community engagement

which requires a longer lead in. It was therefore important to recognise and explain that the exercise would use a process of public dialogue that was closer to market research than genuine community engagement. If these workshops were to be rolled out more widely, they would need to be offered with the potential for a greater lead in time and community liaison.

Options for extending the timescale were explored but it was felt that it was important to complete the meetings by the end of October. This also meant that the meetings would cut across the October holidays particularly in Nairn where two of the three meetings were held during the holiday period.

Given the timescale it was necessary to identify communities that were willing to participate, could work within a relatively short timescale and were also able to support the project team identify potential participants.

Identifying participants

STAR issued a set of guidelines to Machars and participating organisations in Nairn on the types of participants that the team was hoping to involve. The aim was to involve a representative mix of people covering:

- Demography – male/female; good age range
- Geography – people from different villages and rural settlements from within the area
- Interest – to include land managers, recreation, heritage, culture, environment, tourism, business and community interests
- Organisational Representation – to make sure that key community development organisations e.g. community councils were invited.

The aim was to have a cross section of around 20 people at each meeting. To achieve this, the team worked with the local organisations to identify around 40 people in the hope that out of the 40 we would find 20 willing and able to participate.

The choice of the term 'panel' was deliberate and intended to convey the importance of the work with local communities and the findings from the exercise. Inevitably, this kind of exercise is more difficult to initiate where the stimulus comes from outside the community and does not relate to a specific local issue. The study confirmed the practical value of working with an established local community organisation to identify and invite participants, with it proving more difficult to recruit a panel at a distance. Although the team was pleased with the consistent attendance at the panel sessions, there was a sense that the involvement of a local organisation, and the personal contact it provided, made it less likely that numbers would dwindle over the three sessions. Acknowledging participation by providing refreshments (soup and sandwiches before the meetings), raffling a hamper of local produce and paying reasonable travel expenses, also helped maintain involvement.

This process of identifying and inviting participants generally worked well. The principal issue was securing the involvement of younger people. Three young people from the Nairn Youth Forum did attend the first meeting in Nairn but did not come back for the second and third sessions. This was apparently due to the second two meetings falling within the October holidays.

Inevitably, perhaps, this kind of process tends to attract people who have some interest in the subject, a particular concern about the effects of climate change (e.g. wind farm development) or a strong interest in the local area. This means that participants are unlikely to be fully representative of the wider population. However, in both cases the team was pleased with the range of interests and background of people taking part. The use of incentives (payment of travel expenses, provision of

refreshments and weekly raffle of a hamper of local products) is likely to have encouraged the involvement of a wider range of people. More radical alternatives would have been payment of participants under a more explicitly market research based model.

Future development of the methodology

The project team concludes that the work has shown that considering climate change through its effects on the local landscape and quality of life provides a useful methodology for communities. It has the potential to enable people to discuss this important topic and to make decisions about what it is important for them to do to respond and prepare for change. The work has also shown that there is potential to use the concept of ecosystem services to explore the reasons why the local landscape is valued and to assess the likely implications of climate change.

We would recommend some refinement and retrial of the process with a limited number of other communities to consolidate lessons learnt from this pilot.

Following this we would recommend that the process is designed and promoted as a tool for use by communities that want to raise awareness of climate change issues and to influence decisions about adaptation and mitigation responses.

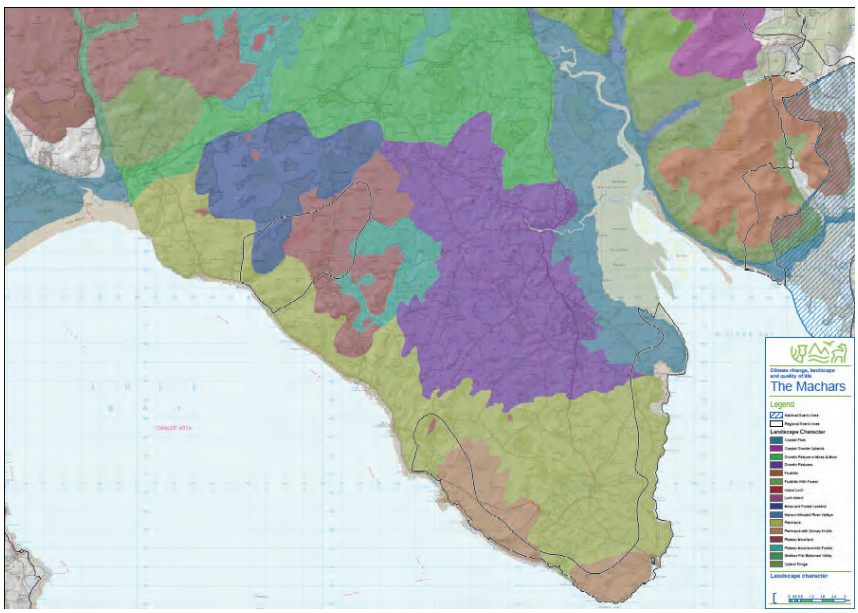
Any refinement of the methodology should explore the extent to which communities have the capacity to run the process using a series of tools but no external facilitation, and the extent to which some form of facilitation is needed in taking people through complex information in a simple way.

6 THE MACHARS

6.1 The Machars comprises a peninsula extending into the outer Solway Firth. To the west lies Luce Bay and the Rhins of Galloway. To the east lies Wigtown Bay and the Fleet estuary.

Figure 5.1: Machars study area

Figure 5.2 Landscape character areas.



The Dumfries and Galloway Landscape Character Assessment, prepared by LUC and published by SNH defines the following landscape character types (see Figure 5.2) within the Machars area::

- **Peninsula**
- **Peninsula with gorsy knolls**
- **Coastal flats**
  - Coastal plain
  - Estuarine flats
  - Coastal moss
  - Merse
- **Moss and Forest Lowland**
- **Drumlin pasture in moss and moorland**
- **Drumlin pastures**
- **Plateau moorland**
- **Plateau with forest**

The area has a rich cultural heritage with many prehistoric, Christian and military sites. The population is concentrated in a number of villages and small towns, most of which are located around the coast. The area is remote from main population centres.

Workshop arrangements

The Machars Climate Change Panel met three times (September 22 and 29 and October 5 2010) at the Monreith Arms Hotel in Port William on the western coast of the Machars. Around 18 local people attended the three sessions.

Findings

Session 1

During the initial part of the first workshop session, participants identified those places, features or qualities that they considered to make the Machars special. People worked in groups of four or five across five tables.

Table 5.1 lists the identified places, features and qualities, by table. They are shown on Figure 5.3.

Table 5.3: Summary of places, features and qualities identified by the Machars Climate Change Panel

Feature	Discussion group
Beaches	A
Christian/Medieval sites	A
Golf course	A
Lochs	A
Tourist sites	A
Christian connection	B
Coastline	B
Isle of Whithorn	B
Views and remoteness	B
Wigtown Booktown and Wigtown NR	B
Bladnoch Distillery	C
Burrowhead	C
Druchtage Mote	C
Garlieston surroundings	C
Isle of Whithorn	C
St Medan's Golf Club	C
St Ninian's Cave	C
Stone circles	C
Whithorn Town	C
Wigtown and surroundings	C
Christianity/Religious	D
Designed Landscapes	D
Golf courses	D
Harbours/ Ports/ Communities	D
Stone Circles	D
Wigtown Bay LNR	D

It is clear from this list that the term landscape is interpreted broadly and includes specific locations, settlements, landscape features, broader areas and qualities.

Figure 5.3: the location of places and features identified by the Machars Climate Change Panel

In the second part of the first workshop session, participants were asked to consider each of these places, features and qualities in terms of the way that they contribute to their quality of life. After a short explanation, each table was provided with a list of benefits and examples based on the ecosystems services approach set out in Section 2 of this report. People recorded the way in which identified places, features and qualities contribute these benefits.

Table 5.2 provides the summarised results of these discussions. The places, features and qualities have been placed in rank order according to the number of benefits (not necessarily the scale of benefit) recorded. The use of colour corresponds to the colours used for the groupings of ecosystem services/benefits defined in Table 2.1. Information has not been aggregated by table, so there is some duplication and overlap within this list.

Some very clear patterns emerge, particularly when the types of benefit are considered. The area appears to be very highly valued in terms of:

- Recreation, tourism, education and wildlife
- Peace and quiet, inspiration and escapism
- Sense of place, sense of history and spiritual values.

Table 5.2: Places, features and qualities, and associated ecosystem services

Feature	Group	Recreation	Tourism	Learning	Wildlife	Food and timber	Freshwater	Fuel	Peace and quiet	Inspiration	Escapism	Sense of place	Sense of history	Spiritual values	Water regulation	Climate regulation	What others?	'Hits'
Lochs	A	■	■	■	■	■	■		■	■	■	■	■	■	■		View	**14**
Designed Landscapes	D	■	■	■	■	■	■	■	■	■	■	■	■					**12**
Beaches	A	■	■	■	■	■			■	■	■	■	■		■			**11**
Coastline	B	■	■	■	■	■			■	■	■	■	■	■				**11**
St Ninian's Cave	C	■	■	■	■	■			■	■	■	■	■	■				**11**
Tourist sites	A	■	■	■	■	■			■	■	■	■	■	■				**11**
Wigtown Bay LNR	D	■	■	■	■	■			■	■	■	■	■	■				**11**
Wigtown Booktown and Wigtown NR	B	■	■	■	■	■			■	■	■	■	■	■				**11**
Garlieston surroundings	C	■	■		■	■		■	■	■	■	■	■					**10**
Harbours/ Ports/ Cmunties	D	■	■	■	■	■			■	■		■	■	■				**10**
Isle of Whithorn	B	■	■		■	■			■	■	■	■	■	■				**10**
Isle of Whithorn	C	■	■		■	■			■	■	■	■	■					**9**
Wigtown and environs	C	■	■	■	■				■	■	■	■	■					**9**
Burrowhead	C	■	■		■				■	■	■	■	■					**8**
Christian connection	B	■	■	■					■	■		■	■	■				**8**
Christian/Medieval sites	A	■	■	■					■	■	■	■	■					**8**
Druchtage Mote	C	■	■	■	■				■	■	■		■					**8**
Golf course	A	■	■	■	■				■		■	■	■					**8**

Stone circles	C																	**8**
Views and remoteness	B																	**8**
Christianity/Religious	D																	**7**
Stone Circles	D																	**7**
St Medan's Golf Club	C																	**5**
Golf courses	D																	**4**
Whithorn Town	C																	**4**
Bladnoch Distillery	C																	**3**
TOTAL		**23**	**26**	**19**	**15**	**12**	**2**	**2**	**24**	**21**	**20**	**19**	**24**	**14**	**2**	**0**	**1**	

Session 2

Session 2 examined the effects of climate change on the features, places and qualities identified as being of importance in the first session. To assist this process and to reduce the duplication between tables, the list of features, places and qualities was amalgamated to create the following:

Freshwater lochs (e.g. Barhapple Loch, Dernaglar Loch, Mochrum Loch, Castle Loch, Fell Loch, Black Loch, Loch Hempton)

Historic houses, gardens and wider designed landscapes (e.g. Glasserton House, Galloway House, Monreith House)

Coastline – beaches (raised beaches, shingle beaches, Milton Point, Baldoon Sands, Wigtown Marsh, Burrowhead), views

Christian heritage – St Ninian's Cove, Glenluce Abbey, Chapel Finian, Cruggleton Church, Whithorn Digs, St Ninian's Chapel, Pilgrim's Way

Wigtown Bay Local Nature Reserve

Harbours and ports (e.g. Garlieston, Isle of Whithorn, Wigtown, Whithorn)

Towns and community – (e.g. Wigtown, Whithorn, Isle of Whithorn, Garlieston)

Prehistoric sites

Recreation and tourism sites – golf courses (St Medans, Wigtown etc), caravan sites, fishing, walking, distillery

Views – to Lake District, Isle of Man, Ireland, Mull of Galloway, sunsets

Associations – Maxwell Family

Peace and quiet and remoteness

Discussion with the Panel identified two further characteristics which had not been raised in the first session but which participants considered central to the area's character:

- agriculture / farming
- geological features

These were added to the list of places, features and qualities, though no evaluation of their contribution to quality of life was carried out.

The above list was divided into four, with each table considering the potential effects of climate change on three or four types of feature, place or quality. For each, they were asked to identify the effect of climate change on the landscape and the positive and negative effects on quality of life. In practice, people tended to record individual climate changes (e.g. increase in winter rainfall) and the implications for the local landscape, with relatively little detail provided on the 'quality of life' effects (landscape benefits). Consequently, some interpretation of the workshop outputs was needed to map out the possible implications for quality of life, based on information provided at the first workshop. The pro forma for this session was modified for the Nairn meeting to try and overcome this problem.

The detailed results from this analysis are presented in Appendix 5. The quality of life assessment from session 1 is reproduced across the top of each section of the table, using the colour coding from Table 2.1.

Table 5.4 presents a very simple aggregation of the Panel's views across all the places, features and qualities considered. While there is some overlap between the

different places, features and qualities discussed by the different tables (meaning some double counting in the 'scoring' against landscape benefits), the emerging pattern is clear. The Panel's views suggest that climate change could result in:

- Major negative effects on sense of place;
- Medium negative effects on wildlife, recreation peace and quiet, inspiration, escapism, sense of history, spiritual values and tourism;
- Minor negative effects on the provision of food/timber and freshwater;
- Minor positive or neutral effects on fuel, water regulation and climate regulation.

The analysis also suggests that the total change in benefits (positive and negative) will be greatest for sense of place, followed closely by tourism (where a relatively large number of positives are outweighed by a larger number of negatives), recreation and learning.

It is likely that effects on some of the more technical types of benefit (climate regulation) are underrepresented. There is, however, a very clear message from the Panel that they consider that climate change could have a major and negative effect on sense of place and a range of the other important benefits that people derive from the Machars landscape. This was confirmed in the concluding plenary discussion at the end of the second session.

Table 5.5: simple totalling of positive and negative effects of climate change on landscape benefits

	Recreation	Tourism	Learning	Wildlife	Food and timber	Freshwater	Fuel	Peace and quiet	Inspiration	Escapism	Sense of place	Sense of history	Spiritual values	Water regulation	Climate regulation
Negatives	28	29	18	22	12	3	2	16	20	16	49	20	13	3	2
Positives	14	20	8	3	8	1	5	1	6	3	5	3	0	3	4

Note: this analysis does not take account of overlaps between different 'Places, features and qualities' and therefore includes some double counting. The totals are therefore only intended to provide an indication of the overall pattern of effect on landscape benefits.

Session 3

In the third session, the focus of the discussion turned to the choices and trade-offs that decision makers have in considering how to address the issues (positive and negative) identified by the Panel during the second session.

The discussion was broken into two parts. The first focused on adaptation responses considered under the following headings:

- Sea level rise;
- Flooding along rivers and burns;

- Agriculture;
- Habitats;
- Recreation and tourism;
- Historic environment;
- Forests and woodland.

Discussions (three groups) followed a short presentation highlighting some of the key options or choices under each of these headings.

Sea level rise was identified in the second workshop session as one of the most important climate related drivers for change, so all three groups considered options and priority responses.

Table 5.6: Machars Panel Recommendations - responding to sea level rise

Group 1 Recommendations	Group 2 Recommendations	Group 3 Recommendations
Focus action and expenditure on the west coast where the raised beach could be flooded by storm tides and rising sea levels with implications for access into the area along the road corridor, villages, businesses, tourism sites and individual houses Recognition that there is likely to be limited funding, so important to target expenditure. Should use the planning system to direct development away from areas at risk of future flooding. On the positive side, rising sea levels could improve access to harbours.	Focus on the flood risk affecting : • Isle of Whithorn where there will be a need to move Christian and other historic sites and rebuild houses • Garlieston where the priority should be relocate the sewage works and move houses, though recognised that funding would be a major constraint on what could be done. Elsewhere adopt a policy of managed coastal realignment – recognising that some people might need to move, but that salt marshes could help protect inland pastures. Again, concerns about the availability of funds to implement this.	Focus flood protection on key centres of population around the coast – Isle of Whithorn, Port William, Garlieston, Newton Stewart Develop a balanced approach to managed realignment along the east coast - providing protection for some of the better low lying agricultural land, while allowing other areas to flood. Need good survey information to develop a strategy. Create new coastal wetlands in advance of existing ones being lost. Accept some loss of coastal historic sites – ensuring they are recorded before loss Reroute coastal roads to cliff tops, or upgrade inland roads to maintain access in and out of the Machars

Flooding along rivers and burns was discussed by one group. The Panel recommendations were as follows:

Table 5.7: Machars Panel Recommendations – Flooding along rivers and burns

Recommendations
Key areas of concern were highlighted as low lying parts of Newton Stewart (including sewage works alongside the Cree), Garlieston and businesses (including distillery) along the River Bladnoch.
Manage drainage in forest and moss areas to retain water (no drainage, or contour drainage)
Develop a new reservoir feature 'Dowlton Loch' on the River Bladnoch to provide flood protection in winter, store water for summer irrigation and provide small scale hydro as well as a new recreation resource.
Widen and deepen small burns

Agriculture was discussed by one group. The Panel recommendations were as follows:

Table 5.8: Machars Panel Recommendations - Agriculture

Recommendations
Recognition that the area could play an increased role in the future if other areas are harder hit by climate change.
Develop a balanced approach to managed realignment along the east coast - providing protection for some of the better low lying agricultural land, while allowing other areas to flood. Need good survey information to develop a strategy.
Retain existing field boundaries and shelter belts.
Develop ways of retaining and storing winter rainfall for summer agricultural use – new reservoirs need to be carefully located and designed – not large ugly tanks.
Overwintering of cattle indoors or the move to fully indoor rearing could create a need for new agricultural sheds – these should be sensitively designed and located. New sheds could include solar PV panels to contribute to clean energy generation and provide a further income stream for farm businesses.
More information and advice for farmers to help inform them about climate change and the longer term decisions they need to start taking now.

Habitats were discussed by one group. The Panel recommendations were as follows:

Table 5.9: Machars Panel Recommendations - Habitats

Recommendations
Develop a balanced approach to managed realignment along the east coast - allowing some areas to flood to create wetland habitats to compensate for existing ones being lost but also providing protection for some of the better lowlying agricultural land.
New tree planting to use the right trees in the right place – function (windbreak, flood management etc), biodiversity and suitability for changing climate.
Improved management of peat bogs, mosses and rivers to maintain wildlife

Recommendations
Restore natural flood plains, to allow flooding in winter and summer grazing
Look to the past to see how habitats were managed
Develop a strategy and provide information

Recreation and tourism were discussed by one group. The Panel recommendations were as follows:

Table 5.10: Machars Panel Recommendations – Recreation and tourism

Recommendations
Maintain the 'right kind of tourism'. Realise the opportunities created by climate change, including: • Increase anchorage sites to benefit from rising sea levels • Promote beaches and swimming sites • More small, friendly campsites and B&Bs • Coastal paths and trails (e.g. 'Saints and sinners' trail or national trail) • Inland recreation associated with new lochs (see rivers and burns recommendations above) • Get businesses to characterise their local sense of place and use for marketing the area
Develop a policy/strategic plan or wind farms which locates them away from tourist areas. Specific reference to Wigtown Bay where off shore wind farm development might affect tourism. Recognised as an area where there may be a need for trade-off. Recommended that Feed-In Tariffs are used to encourage farmers to develop more small turbines as an alternative to larger developments.
Other tensions and trade-offs included: • Effects of more visitors on the busyness of the area – do local communities want more visitors? • Interaction of access and farming (e.g. footpaths through intensively stocked fields)

The Historic Environment was discussed by one group. The Panel recommendations were as follows:

Table 5.11: Machars Panel Recommendations – historic environment

Recommendations
Recognition that it will be difficult to preserve and protect all historic sites.
Emphasis on local recording of historic sites and their stories – by the local community as well as Dumfries and Galloway Council and Historic Scotland. Examples including St Ninian's Cave and the Martyr's Stake.
Use this information to provide interpretation and promotion for tourism

Forests and woodlands were discussed by one group. The Panel recommendations were as follows:

Table 5.12: Machars Panel Recommendations - Forests and woodlands

Recommendations
Raise awareness of land owners to the importance of managing and maintaining existing small woodlands and shelter belts.
Consolidate and reinforce existing woodlands in preference to new large scale planting in the area.
Promote the importance of monkey puzzle trees at Monreith House (large number of trees of a type now extinct in native Chile) – manage these to limit the impacts of climate change.

Reducing carbon emissions

The second part of the session focused on how the Machars area should contribute to climate change mitigation – by reducing carbon emissions, or increasing carbon sequestration. Group discussions followed a short presentation which set out national targets, the local 'share' of this and the relative contribution of different types of renewable energy and other measures such as woodland planting. All three groups considered options and priority responses.

Table 5.13: Machars Panel Recommendations – climate change mitigation

Group 1 Recommendations	Group 2 Recommendations	Group 3 Recommendations
Reduce energy consumption by: • Journey management, public transport • Insulation • Recycling • Solar water heating and heat recovery Local fuel production:	Recognition that communities in the area will need to live 'with a bit of everything' – in terms of a mix of renewable energy types, woodland expansion and energy efficiency.	More woodland (forest and copses) to act as carbon sinks and to provide continual cover for wildlife In terms of renewable energy, the area needs 'a bit of everything' and not large windfarms. The mix should include:

Group 1 Recommendations	Group 2 Recommendations	Group 3 Recommendations
• Sustainable forestry / coppicing • Promoting wood as a fuel • Wood pellet production from forestry brash Renewables: • Tidal and wave energy • Pump storage schemes • Hydrogen fuelled cars		• Small wind turbines • Wood promoted for fuel • Solar energy • Energy efficiency

Overview

Discussions at all three tables and in the plenary session that followed suggested the following:

- Recognition that climate change is likely to result in significant change across the area and that it will not be possible to prevent this;
- A concern that the focus should be on managing this change to retain or (where it may be lost) record what is important and distinctive about the area;
- A number of areas where a strategic or co-ordinated approach will be needed to come up with the most effective solutions;
- For some issues and responses, action is needed now;
- There will be some tensions, trade-offs and compromises;
- A general preference for smaller scale and diverse approaches to carbon reduction which could fit better with the local area's resources and character rather than large scale wind farm development;
- Recognition that funding for actions in the area will be limited, particularly when this is set within the context of even greater changes affecting other parts of Scotland and the UK;
- Recognition that there may be competing pressures for land from agriculture, habitats, flood protection, sea level change and renewables.

Policy Implications

Following the third session, the project team analysed the Panel Recommendations in terms of the potential linkages with the existing policy framework. There is of course a need to acknowledge that many of the climate impacts and priority actions are likely to occur over a period longer than the lifetime of existing policies. A detailed analysis of the policy implications of the Panel Recommendations is included in Appendix 6.

Key policy links include:

- Implementation of the Shoreline Management Plan including recommendations for specific coastal management units and approaches to management of coastal heritage;
- Local development plan policies, including locating development away from flood risk areas and influencing policies for renewable energy development;
- Implementation of forest and woodlands strategies and forest design plans;
- Development and implementation of flood management strategies;
- Implementation of the Scottish Rural Development Programme to inform long term land management practices;
- Development and implementation of the area's tourism strategy.

Lessons learned

The Machars Climate Change Panel meetings were generally very successful with good and consistent attendance and contributions to discussions. Most elements (presentation, discussion, feedback and reporting back) seemed to go well. The following specific issues have been raised and were carried forward to the refined approach used in Nairn:

- Some concern that the first session appeared unrelated to the issue of climate change and seemed to be providing information which could be used to market or promote the area - though session 2 made it clear why this information was needed. The approach is described at the start and end of session 1, but can perhaps be made clearer.
- Modification of the pro forma for session 2 to ensure Panel members record climate changes, effects on places, features and qualities and implications for quality of life (using the framework of defined benefits).
- A clearer agenda (checklist or key questions) for discussions in session 3 to focus discussion and aid facilitation.
- Session 3 in particular demands considerable discussion and in the Machars overran by 30 minutes. A stricter agenda could help address this, but there may also be a need to focus on those policy areas most relevant to the area.

It was recognised that the older people were over-represented and younger people under-represented on the Panel. In part, this reflects the willingness of people to engage with this kind of community based exercise. However, additional efforts were made to secure the participation of younger people in the Nairn sessions that followed the Machars Panel meetings.

7 NAIRN

The second set of meetings was held in Nairn in Highland. The town lies at the mouth of the River Nairn on the southern side of the Inner Moray Firth to the east of Inverness. The sandy and low lying coastline gives way to a band of intensive agricultural land, forests and moorlands to the south. Nairn's historic association with fishing is reflected in the dense area of former fishing cottages in Fishertown close to the harbour. The town also includes extensive Victorian and twentieth century residential areas. It lies on the A96 Inverness to Aberdeen trunk road and the Inverness to Aberdeen railway line.

The study proposed study area for Nairn extended east and west along the coast, but not very far inland to the south. In discussion with the Nairn Climate Change Panel, the study area was redefined as the former county of Nairnshire which did not extend as far to the east and west but further south to include the moorlands beyond the River Findhorn.

Figure 6.1 : Nairn study area

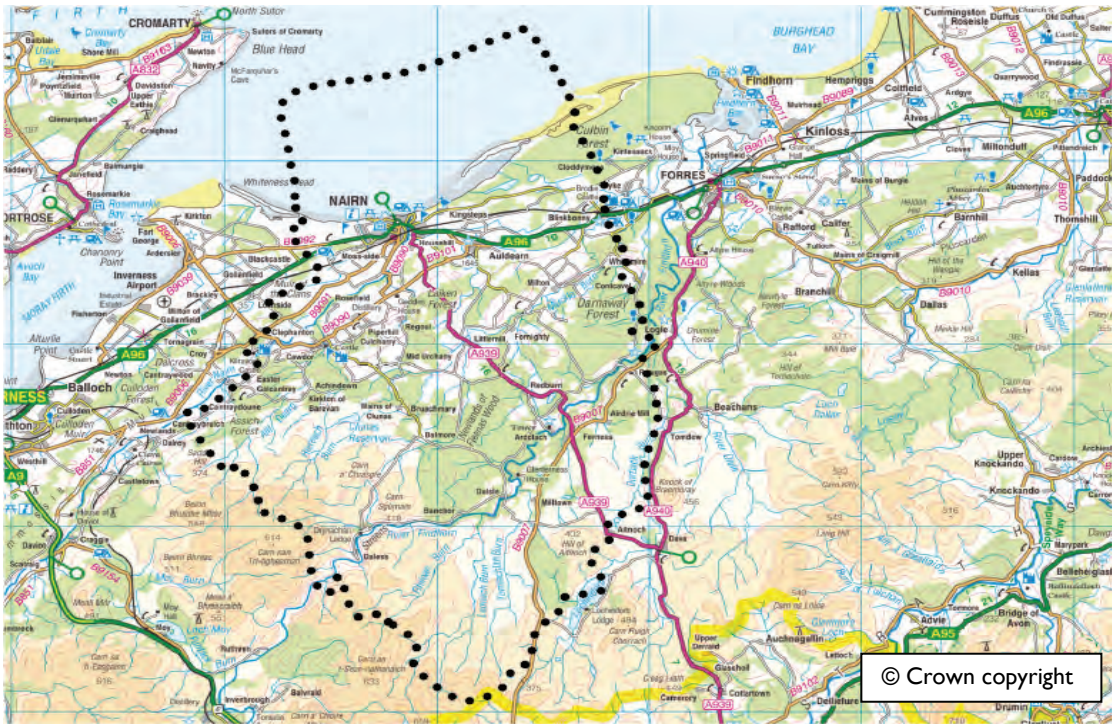
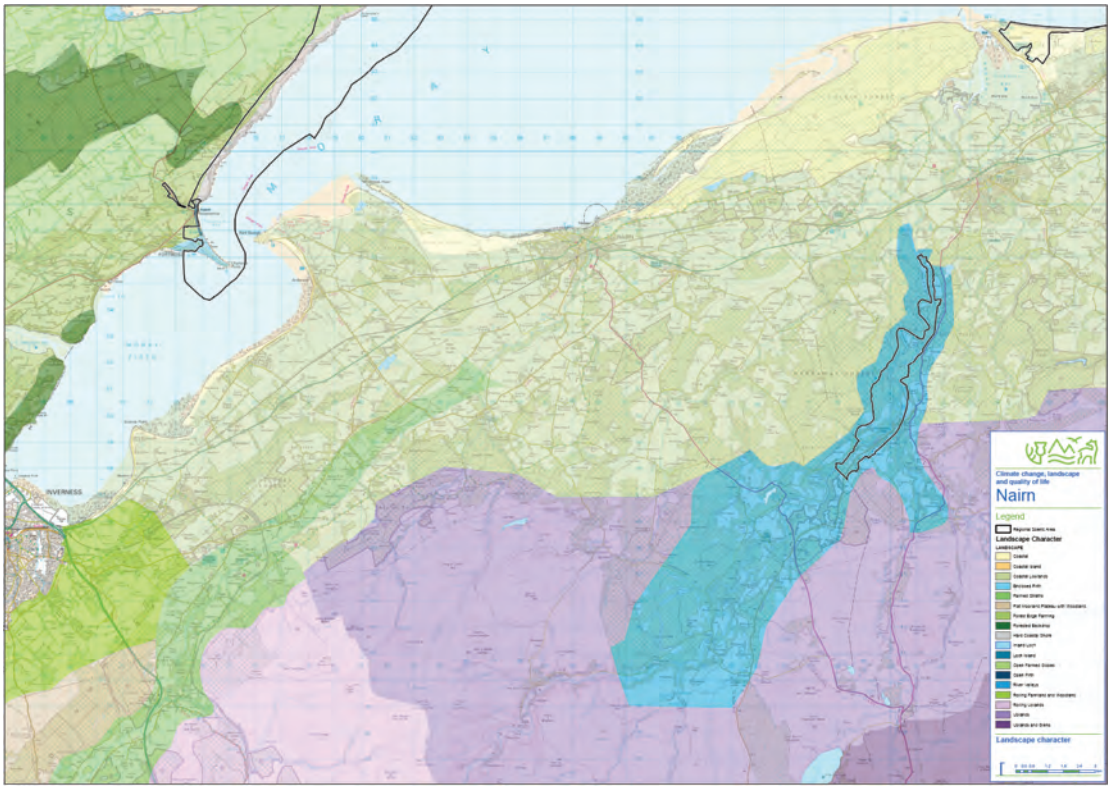


Figure 6.2 shows the landscape character areas identified by the Inner Moray Firth and Moray and Nairn Landscape Character Assessments.

Figure 6.2: Landscape character areas



The LCAs defined the following landscape character types within the study area:

- Open firth;
- Enclosed firth;
- Coastal forest;
- Intensively farmed areas;
- Forest edge farmland;
- Narrow wooded valleys;
- Upland moorland and forests.

In addition the historic town of Nairn itself, the area has a number of historic sites including designed landscapes such as at Cawdor. The population is concentrated in Nairn and a number of small villages and hamlets.

Workshop arrangements

The Nairn Climate Change Panel met three times (October 13, 20 and 27) at the Nairn Community Centre. Around 15 local people attended the three sessions.

Findings

Session 1

The first task was to agree the 'study area' with participants. The project team had proposed an area running along the coast from east to west, defined by Culbin in the east, Fort George in the west and extending south as far as the River Findhorn. There was consensus among panel members, however, that the work should focus

on the old county of Nairnshire (roughly equating to the Highland Council Nairn Ward. This area extends further south to include extensive moorland areas in addition to lower areas of farmland, forest and coast.

During the next part of the first workshop session, participants identified those places, features or qualities that they considered to make Nairnshire special. People worked in groups of four or five across five tables.

Table 6.1 lists the identified places, features and qualities, by discussion group. They are shown on Figure 6.3.

It is clear from this list that the term landscape is interpreted broadly and includes specific locations, settlements, landscape features and broader areas. A number of locations or areas were identified by three or more tables, indicating a high level of agreement about the most important aspects of the area that make it special.

Figure 6.3: the location of places and features identified by the Nairn Climate Change Panel

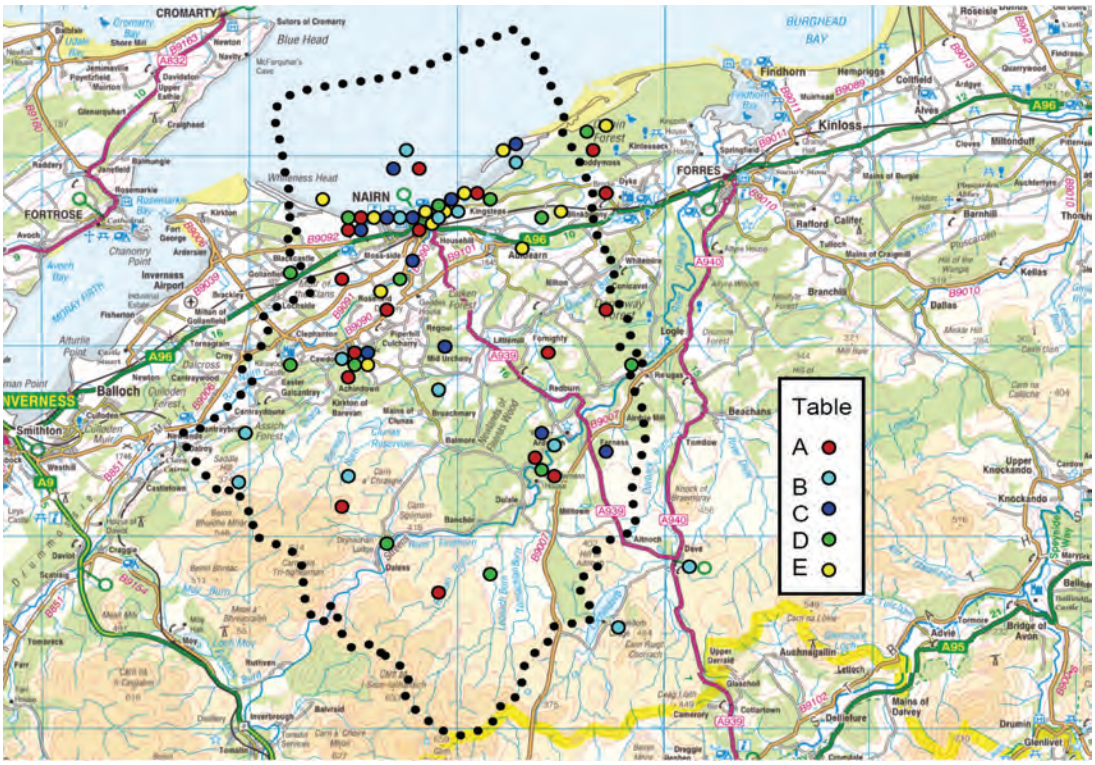


Table 6.1: Important places and features identified by the Nairn Climate Change Panel

Feature / place	Group A	B	C	D	E	TOT
Cawdor Castle and woods						5
Culbin sands and forest						5
Nairn beach (East and West)						5
Nairn River						5
Findhorn river and gorge, Dulsie Bridge, Ardclach						4
Moorlands						3
Moray Firth						3
Nair golf courses						3
Nairn Links and bandstand						3

Farmland along coastal / A96 corridor						2
Nairn harbour						2
Ardcach Bell Tower						1
Blanket bogs						1
Brodie Estate						1
Dava						1
Distillery						1
Docut						1
Fishertown and historic Nairn						1
Forests – Darnaway, Lethen, Cawdor, Glenferness						1
Ice House						1
Kilravoch Castle						1
Lochindorb						1
Macbeth Hillock						1
Moray Estate						1
Old drove roads						1
Ord Hill						1
Rural Roads						1
Saddle Hill						1
Sand bars						1

In the second part of the first workshop session, participants were asked to consider each of these places and features in terms of the way that they contribute to their quality of life. After a short explanation, each group was provided with a list of benefits and examples based on the ecosystem services approach set out in Section 2 of this report. People recorded the way in which places and areas contribute to these benefits.

People were asked to focus initially on those places which they considered most important to the area. Given the agreement between groups on several of the most important features, it is not surprising that there was duplication in this part of the session, with several groups evaluating the benefits provided by a number of features. While this underlined the importance of a number of features, it meant that, given the time limitations for this exercise, a number of features remained unevaluated. An alternative would have been for the facilitators to have allocated features to different groups.

Table 6.2 provides the summarised results of these discussions. The places, features and qualities have been placed in rank order according to the number of benefits (not necessarily the scale of benefit) recorded. The use of colour reflects the groupings of ecosystem services/benefits described in Section 2 and presented in Table 2.1. Since several features were evaluated by more than one group, the results have been aggregated by feature. The number within each cell records the number of groups recording the benefit in question. Figures on the right hand side of the table record the number of different benefits recorded for each feature and the total number of hits, taking into account the number of groups recording the benefit in question.

Some clear findings emerge, including:

- The broad range of benefits derived from the most valued landscape features with recreation, wildlife, learning, tourism, peace and quiet, inspiration, sense of place and sense of history being the most frequently recorded benefits;

- The lower importance attached to spiritual values (contrasting with the Machars findings) and, to a lesser degree, to freshwater, fuel and water and climate regulation;
- The importance of Nairn Beach, Nairn River, Cawdor Castle and woods the Moray Firth in contributing to quality of life.

Session 2 examined the effects of climate change on the features, places and qualities identified as being of importance in the first session. To assist this process and to reduce the duplication between groups, the list of features, places and qualities evaluated (see Table 6.2) was supplemented with some of the other important features identified in the first session where the facilitators considered there was the potential for different kinds of climate change impact (these additions are shown in *italics*).

Nairn beach (East and West)	Nairn golf courses
Cawdor Castle and woods	*Nairn harbour*
Nairn River	*Fishertown and historic Nairn*
Findhorn River and gorge, Dulsie Bridge, Ardclach	*Moorlands and blanket bogs*
Moray Firth	*Farmland along coastal / A96 corridor*
Culbin sands and forest	*Forests – Darnaway, Lethen, Cawdor, Glenferness*
Doocut	
Saddle Hill	

Table 6.2: Places, features and qualities, and associated ecosystem services

Feature	Recreation	Tourism	Learning	Wildlife	Food and timber	Freshwater	Fuel	Peace and quiet	Inspiration	Escapism	Sense of place	Sense of history	Spiritual values	Water regulation	Climate regulation	What others?	Benefits/ total hits
Nairn beach (East and West)	5	5	5	5	3	1	2	5	5	5	5	4	1	3	2	health	**16/57**
Cawdor Castle and woods	2	2	2	2	2	1	1	2	2	2	2	2		1	2	economic	**15/26**
Nairn River	4	2	4	4	3	2		2	2		3	3	1	2	1	sewerage	**14/34**
Findhorn river and gorge, Dulsie Bridge, Adrclach	2	2	2	2	1		1	1	1		1	1	1	1			**12/16**
Moray Firth	2	2	1	2	2		1	2	2	2	2	2			1		**12/21**
Culbin sands and forest	1	1	1	1	1		1	1	1	1		1			1		**11/11**
Docut	1	1	1	1				1	1	1	1	1	1		1		**11/11**
Saddle Hill	1	1	1	1	1	1		1	1	1	1	1					**11/11**
Nair golf courses	1	1	1	1		1		1	1	1							**8/8**
TOTAL	**19**	**17**	**18**	**19**	**13**	**6**	**6**	**16**	**16**	**13**	**15**	**15**	**4**	**7**	**8**		

The above list was divided into three, with each group considering the potential effects of climate change on three or four features or places. For each, they were asked to identify the effect of climate change on the landscape and the positive and negative effects on quality of life. The approach differed slightly from that used in the Machars, in that people were asked to record the relevant aspects of climate change, the possible effects on the feature in question and to circle the benefits that could be positively or negatively affected. This proved to be a little too complex given the time available and the analysis of effects on benefits appeared to suffer as a result.

The detailed results of the discussions for each of the places, features and qualities are presented in Appendix 7. The quality of life assessment from session 1 is reproduced across the top of each section of the table.

Table 6.4 presents a very simple aggregation of the Panel's views across all the places, features and qualities considered. While there is some overlap between the different places, features and qualities discussed by the different tables (meaning some double counting in the 'scoring' against landscape benefits), the emerging pattern is clear. The Panel's views suggest that climate change could result in:

- An increase in recreation, learning and fuel benefits;
- A mix of decreased and increased wildlife, food and timber, freshwater, water regulation and climate regulation benefits;
- A decrease in tourism, peace and quiet, sense of place and sense of history benefits;
- Little or no effect on inspiration, escapism or spiritual benefits.

It is likely that effects on some of the more technical types of benefit (climate regulation) are underrepresented. There is, however, a very clear message from the Panel that they consider that climate change could have a major and negative the benefits that people derive from the Nairnshire landscape. This conclusion echoes the Machars findings, though the pattern of effects on benefits is different, in part reflecting the differences in methodology used in the two locations.

Table 6.5: simple totalling of positive and negative effects of climate change on landscape benefits

	Recreation	Tourism	Learning	Wildlife	Food and timber	Freshwater	Fuel	Peace and quiet	Inspiration	Escapism	Sense of place	Sense of history	Spiritual values	Water regulation	Climate regulation	What others?	total
Positive	12	9	3	12	7	2	9	0	0	0	1	0	0	5	5	0	65
Negative	8	15	0	16	7	2	4	4	0	1	9	9	1	5	3	0	84

Session 3

In the third session, the focus of the discussion turned to the choices and trade-offs that decision makers have in considering how to address the issues (positive and negative) identified by the Panel during the second session.

The discussion was broken into two parts. The first focused on adaptation responses considered under the following headings:

- Sea level rise;
- Flooding along rivers and burns;
- Agriculture;
- Recreation and tourism;
- Forests and woodland.

The second focused on ways of reducing carbon emission.

Group discussions (three groups) followed a short presentation highlighting some of the key options or choices under each of these headings. Each group table covered two themes, reflecting the finding from the Machars that any more than this was too demanding, given the time limitations.

Sea level rise was identified in the second workshop session as one of the most important climate related drivers for change, so two of the three groups considered options and priority responses.

Unlike the Machars, where people were provided with a blank sheet on which to record their conclusions and recommendations, the Nairn meeting made use of a proforma which was prepopulated with impacts and opportunities discussed in the second session and prompts for actions, lead organisations and timescales.

Table 6.6 sets out the results of these discussions, summarising the key impacts and opportunities, and the Panel's recommendations in relation to each. The policy implications of these recommendations are considered in detail in Appendix 8.

TABLE 6.6: SEA LEVEL RISE AND AN INCREASED RISK OF STORM SURGES

Key impacts and opportunities	**WHAT NEEDS TO BE DONE**	**WHO SHOULD BE INVOLVED AND WHEN**			
		Local	Council level	National level	Now, within 10 years, beyond 10 years?
Increased risk of flooding to Fishertown and low lying properties along the coastline	Construction of new flood wall along river and harbour as far as the swimming pool Dredging of riverbed as far as the railway bridge		Highland Council	SEPA	
	Reinstate flood areas – e.g. Maggot Wall along riverside Conservation area		Highland Council		
Impact on Culbin Sands – loss of inter-tidal habitats, possible changes in erosion and deposition	Manage movement of habitats		Forestry Commission		
	Might need to make sacrifices. Better management of woods – fell trees in lowlying areas to allow coastal habitat to develop as sea level rises. Local study on regular basis for 20-30 years	Local group		Forestry Commission RSPB SNH	
Flooding, erosion affecting coastal recreation sites, including golf courses	Provide coastal protection to protect Nairn Golf Course. Alter the layout of the Nairn Bunbar Golf Course – two holes below sea level Protect the Links by raising the sea wall from the Harbour to the swimming pool		Highland Council		
	Accept the loss of one golf course				
Loss of farmland and woodland to the sea	Sacrifice some areas of farmland to flooding – including along the river to help reduce the threat of flooding from the river			Scottish Government	
	Sacrifice farmland close to river – make into floodplain	Local estate			
Impacts on Nairn harbour – greater water depth, but more exposed to storms.	Raise the harbour wall		Highland Council		
	Encourage more boats into harbour Relocate boatyard Build wall along riverside		Highland Council	Scottish Government	

TABLE 6.7: CHANGES IN RIVER FLOWS ALONG RIVERS NAIRN AND FINDHORN – FLOODING IN WINTER, DROUGHT IN SUMMER

Key impacts and opportunities	**WHAT NEEDS TO BE DONE**	**WHO SHOULD BE INVOLVED AND WHEN**			
		Local	Council level	National level	Now, within 10 years, beyond 10 years?
Increased risk of flooding to Fishertown and low lying properties along the rivers	Dredging of riverbed as far as the railway bridge			SEPA	
Impact on river habitats and adjoining areas	Sacrifice some areas of farmland to flooding – including along the river to help reduce the threat of flooding from the river				
Erosion to river banks and possible changes in the river course	Stabilise river banks upstream from Meallmhor Lodge	Nairn and District Fishery Board Estates and occupiers		SEPA	
Low flows during summer impacting on water abstraction, fishing, irrigation etc	Farmers to reduce water extraction	Farmers		SEPA	
Impacts on Nairn harbour – greater water depth, but more exposed to storms.	Raise the harbour wall		Highland Council		

TABLE 6.7: CHANGES IN AGRICULTURE

Key impacts and opportunities	**WHAT NEEDS TO BE DONE**	**WHO SHOULD BE INVOLVED AND WHEN**			
		Local	Council level	National level	Now, within 10 years, beyond 10 years?
Longer growing season and warmer summers support an intensification of farming potentially resulting in: • new crops • new farm buildings • greater use of irrigation and storage of winter rainfall in small reservoirs • loss of field boundaries, trees and small woodlands – further opening up the landscape	Water storage to cope with growing demand from population and farmers Potential to change crops – with implications for irrigation Farmers to take account of increased risk of soil erosion in summer Maintain field boundaries – currently controlled	Local capture of water Awareness of water conservation Local farmers		North of Scotland Water Authority Scottish Government Forestry Commission	Continual adaptation
Increases in winter rainfall could affect winter farm operations (machinery, sowing times) and may require measures to reduce soil erosion	Difficulties in predicting the season for planning ahead Changes in variety to adapt to changing conditions	Cropping plans			Yearly adaptation

TABLE 6.8: RECREATION AND TOURISM

Key impacts and opportunities	**WHAT NEEDS TO BE DONE**	**WHO SHOULD BE INVOLVED AND WHEN**			
		Local	Council level	National level	Now, within 10 years, beyond 10 years?
Warmer, drier summers could allow an expansion of tourism activity	Family based mountain biking tracks Bird and wildlife recreation, signage, marketing in Culbin woods Festivals etc	Local businesses working together	Highland Council signage	Visit Scotland	Now
Coastal flooding and erosion could affect a number of important coastal recreation sites – the historic town, golf courses, beaches and Culbin sands, and could affect water / beach quality	Provide protection in the form of hard and soft flood defences, groynes Develop Whiteness for wildlife Ensure sewage treatment works have capacity to maintain water quality / beaches			Scottish Water	
Wetter winters could make outdoor recreation less attractive, creating demand for indoor facilities and making paths and trails more susceptible to erosion and damage	Expand paths and tracks around settlements and improve their management Develop other leisure activities Open Sundays?	Individuals Businesses Community Council			

TABLE 6.9: FORESTS AND WOODLAND

Key impacts and opportunities	**WHAT NEEDS TO BE DONE**	**WHO SHOULD BE INVOLVED AND WHEN**			
		Local	Council level	National level	Now, within 10 years, beyond 10 years?
Damage and loss of existing trees, woodlands, historic trees (e.g. Cawdor) as a result of storm damage, drought, waterlogging	Replace storm damaged trees and replant Cut down diseased elm trees Plant new trees in towns – identify areas for planting	Community Council Cawdor Estate	Highland Council		
Damage and loss of productive coniferous forestry – changing species, moves away from clear-fell and towards continuous cover.	Develop birchwood and other similar species as commercial products	Cawdor Estate		Forestry Commission	
Creation of new woodland belts to provide shelter and shade, and to help connect existing habitats, allowing species to adapt to climate change	Plant new trees along the riverside	Community Council	Local estates	Forestry Commission	
New woodland to absorb CO2 from the atmosphere	Plant native species Re-introduce WGS – better funding for trees			Forestry Commission	
New woodland to intercept rainfall and reduce the risk of flooding along rivers	Planting along riversides – management of existing trees				

Reducing carbon emissions

The second part of the session focused on how the Nairnshire area should contribute to climate change mitigation – by reducing carbon emissions, or increasing carbon sequestration. A plenary discussion followed a short presentation which set out national targets, the local 'share' of this and the relative contribution of different types of renewable energy and other measures such as woodland planting. Discussion themes included the following:

- Maximise the use of biomass as fuel for houses and public buildings. Local support to encourage installation of suitable boilers. Link creation of new forestry to new woodfuel;
- Better management of peatlands to store and absorb CO2;
- Energy efficiency in transport – better public transport to encourage people out of their cars;
- Planning policies should require all new houses to include solar panels or other kinds of renewable energy;
- Mixed views on the potential for wind farms – some raising concerns about the potential impact on tourism, others suggesting need to consider potential of the moorlands to accommodate wind farms;
- Measures to capture methane from dairy cattle – including anaerobic digestion of waste and changes in silage production;
- Energy generation from tidal power between Channonry Point and Fort George – though recognised effects on Bottlenose Dolphin population.

Policy Implications

Following the third session, the project team analysed the Panel Recommendations in terms of the potential linkages with the existing policy framework. There is of course a need to acknowledge that many of the climate impacts and priority actions are likely to occur over a period longer than the lifetime of existing policies. A detailed analysis of the policy implications of the Panel Recommendations is included in Appendix 8.

Key policy links include:

- flood management strategies;
- Highland Council Climate Change Adaptation Strategy;
- Long-term land management practices via the Scottish Rural Development Programme;
- Highland Coastal Management Strategy;
- Core Path Plan;
- Work of the Highland Area Tourism Partnership;
- Forest and Woodland Strategies and Forest Design Plans.

Lessons learned

The Nairn Climate Change Panel meetings were generally very successful with good and consistent attendance and contributions to discussions. Most elements (presentation, discussion, feedback and reporting back) seemed to go well. The following specific issues were raised:

- Some concern that the discussions were not long enough and that participants felt they were being overly managed through the process
- A concern that the final discussion in Session 3, focusing on climate change mitigation, was a little short and would have justified more detailed exploration
- While three younger people attended the first session, they did not return, perhaps suggesting that a more tailored approach may be required for this group.

8 CONCLUSIONS AND RECOMMENDATIONS

Introduction

This final section of the report draws out the key findings from the research suggesting how they might be applied and describing how the methodology could be used and further developed in the future.

The chapter is structured as follows:

- Identification of landscape features
- The use and identification of ecosystem services
- Analysis of climate change and its implications for the landscape
- Choices and trade-offs
- Use of the study findings
- Future development and application of the methodology

Specific methodological conclusions are included at the end of Chapter 4 of this report.

Identification of landscape features

The first session in each location initially focused on the identification of key landscape features – described as comprising areas, places, specific features or qualities. People were asked to list the kinds of features people would refer to if describing the landscape to someone who had never visited the area in question.

This part of the process provided clear evidence that people find it relatively straightforward to pick out those elements of the landscape that contribute most strongly to an area's identity. Aspects of the landscape that were identified ranged from broad areas (comparable to landscape character areas), types of feature (e.g. particular types of historic sites), specific elements or places (including historic buildings) to qualities such as peace and quiet or views.

The lists of important landscape features are broadly compatible with the key characteristics defined within Landscape Character Assessments, though they tend to be more detailed and specific in nature. They are also not comprehensive – simply the representing the most valued aspects of each area.

There were some differences between the types of feature and area identified by two panels. In Nairn, there was strong agreement around a limited number of landscape elements (e.g. Nairn beaches, Culbin Forest, Cawdor Castle and Woods). In the Machars there was a little less agreement about specific places, though considerable agreement about the importance of particular types of feature (e.g. coastal features, early Christian heritage, woodlands and forests, coastal settlements). This may reflect the dominance of particular aspects of the Nairn landscape, and the more varied and dispersed nature of the Machars landscape.

The use and identification of ecosystem services

The adapted framework of ecosystem services provided a valuable framework with which to explore how individual landscape features contribute to quality of life. The panels quickly grasped the concept of 'benefits' and were able to apply it to the features they had earlier identified.

The results suggest that the landscape is valued for a broad range of reasons with some of the most important features, places or areas providing benefits under each of the ecosystem service headings.

The results are relevant to the specific features identified by the panels, and to the (albeit partial) picture presented by all of the features evaluated within the area in question.

The Machars panel highlighted the following ecosystem service headings as being of most importance overall – recreation and tourism, learning, wildlife, peace and quiet, inspiration, escapism, sense of place, sense of identity and spiritual values. Similar patterns emerged in Nairn, though food and timber production and, to a lesser extent, water and climate regulation were also judged to be important benefits. Spiritual values, on the other hand were considered to be of less importance. This is an explainable difference, given the presence of Christian heritage features in the Machars and the greater prominence of intensive farmland and coniferous plantation woodlands around Nairn.

Analysis of climate change and its implications for the landscape

The first part of the discussion focused on patterns of climate change recorded over recent decades. Both groups recognised some of the changes with specific reference to:

- The length of the growing season
- Changing patterns of river flow – with flooding and drought more common;
- Less severe winters
- A blurring or loss of seasonality
- Greater day to day variation in climate
- An increase in windiness
- A range of specific weather events.

Subsequent discussions focused on the likely implications of projected climate change for the important landscape features identified by each panel. While the panels found this part of the process challenging, a number of common issues emerged, including:

- The effects of sea level rise (allied to surge tides in the case of Nairn) on coastal settlements, historic sites, recreation areas, transport infrastructure and habitats;
- The implications of increases in winter rainfall for flooding, with potential effects on property, roads, farmland and historic sites;
- The effects of drier summers and wetter winters on the farming sector, with a range of effects including intensification of production, risks of soil loss or damage, an increase in indoor cattle rearing, wider use of irrigation (linked to on-farm storage) and the introduction of new crops. In Nairn, it was suggested that wider use of shelterbelts would help reduce wind erosion of light, sandy soils.
- The panels identified different impacts on tourism. In the Machars, better summer weather was considered likely to bring more people into the area, creating local economic opportunities, but also requiring management and potentially affecting some of the area's sense of remoteness, peace and quiet. In Nairn, the impacts were judged to be more negative overall, with sea level rise affecting some of the key features that underpin tourism in the area.

- Both panels identified potential effects on woodland and trees, including farm woodlands and field boundaries, policy woodlands and specimen trees and productive coniferous plantations. Some of these effects reflected changes in land management, others the combination of drought, water logging, storm damage and pests and disease.

Choices and trade-offs

During the final session, the climate change panels discussed responses to the effects of climate change on their local area, considering adaptation and mitigation measures. Both panels acknowledged the scale of potential change and explored pragmatic responses which reflected local priorities alongside practicalities and, in a broad sense, factors such as cost. For the most part, therefore, the panels concluded that an emphasis should be placed on managing change, rather than trying to prevent it. This would help ensure that the most important aspects of the landscape (and its benefits) are retained, and in some areas, enhanced. The panels recognised that this approach would entail sacrifices (e.g. the loss of historic sites and road infrastructure along the coast) and that for a number of issues there would be a need for a strategic and co-ordinated approach over a considerable timescale.

The two panels' approach to climate change mitigation measures was similarly pragmatic. While some members of both panels were strongly opposed to wind farm proposals in the area surrounding both communities, others were less opposed, seeing these kinds of development as part of a broader approach to renewable energy development. Overall, there was strong support for a mixed approach, for example using a combination of biomass, biogas, individual wind turbines, small scale hydro, tidal and solar energy schemes. People also drew a clear link to energy efficiency measures, including within the transport sector. The role of peatland and woodland in absorbing and storing carbon was recognised, though participants saw relatively little scope for woodland expansion, particularly in the Machars.

Use of the study findings

The study findings should be relevant to a number of different applications including:

- More detailed information on locally valued landscape features to supplement and complement published Landscape Character Assessments should help inform local landscape management and planning decisions;
- A better understanding of why landscape features are judged to be important should also inform local landscape management and planning;
- The work provides a practical example of how to engage with local communities on landscape related issues, in the spirit of the European Landscape Convention;
- The panel recommendations and the analysis of the local, council and national policy implications should provide a link between this work and future policy development. Key linkages could include the local development plan, development management, the community planning process, renewable energy strategies, the work of non-governmental organisations such as RSPB, land management and forestry, including application of the SRDP and the management objectives of large estates, coastal flood defence, catchment management and economic development strategies.

Future development and application of the methodology

Chapter 4 of this report discussed ways in which the methodology could be further developed and refined. This section focuses on broader issues around its application and use. These include:

- Dissemination of the results locally and with partner organisations in the form of community reports and this document.
- Review of the methodology in the light of the findings from other Sciencewise-ERC funded pilot projects elsewhere in the UK to draw on best practice and lessons learned;
- Wider application of the approach including:
  - Urban/suburban/post industrial areas
  - Specific groups such as schoolchildren
  - Identifying types of community that might be interested in exploring local climate change effects (e.g. communities that have been in receipt of funding from the Climate Challenge Fund). While these might not be representative of the wider population, such an approach could build up a greater body of evidence on valued landscape features, local climate change impacts and responses.
- There is potential to develop a toolkit to support wider analysis of these issues at a local scale. This could include the definition of key steps, resource and information pointers and workshop agendas and pro-forma. Careful consideration should be given to the extent to which the process can be simplified and made more straightforward to operate without 'expert' inputs. It is likely that some degree of facilitation will be required, whether this is provided by local authorities, SNH area staff or via organisations such as SCCIP. Any toolkit should be carefully piloted with a willing community before being made more widely available. Ideally, participating communities would share the results of their analysis, possibly using a web based toolkit to provide information and record and share results.
- Although this work has focused on exploring issues associated with climate change, there is potential to use the methodology to explore the implications of different types of landscape change. This could include strategic issues (e.g. the development of Forest and Woodland Strategies or Open Space Strategies), the analysis of different policy options (e.g. during the preparation of development plans and the strategic environmental assessment process), or the consideration of specific development proposals (e.g. settlement expansion, road development or retail development). In each case the process would include identification and evaluation of what is currently important and why, analysis of the effects of the change in question on these important features or qualities, leading to recommendations on the way forward. The methodology would need careful review to ensure it fitted the task in question, considering issues such as the scale of working, the range of relevant stakeholders and the range and detail of 'options' considered by the exercise.
- The methodology could also be adapted to concentrate on particular elements of the approach, including the identification of locally important features and the analysis of ecosystem services. This could provide inputs to local planning processes such as Conservation Area Appraisals or village design guides.

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ISBN: 978-1-85397-826-5

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