



Adapting to Climate Change:

*An introduction for **Public Sector** policy makers,
resource managers & practitioners*

www.sccip.org.uk

SCCIP

scottish **climate change**
impacts partnership

INTRODUCTION

The global climate is changing with far reaching implications for Scotland. Greenhouse gases already emitted into the atmosphere mean that some climate change is unavoidable regardless of future emissions. Adapting to climate change presents a significant challenge for organisations across Scotland's public sector which must consider the risks and opportunities presented.

Public sector organisations have an essential role to play in helping Scotland prepare for, and respond to changes in climate. They are strongly encouraged to take an early and planned approach to climate change adaptation;

'All public bodies need to be resilient to the future climate and to plan for business continuity in relation to delivery of their functions and the services they deliver to the wider community'.

Public Bodies Climate Change Duties: Putting them into practice, Scottish Government, 2011

This document provides public sector policy makers, resource managers and practitioners with an introduction to climate change adaptation. It includes:

Climate information: Key facts and figures about the changes in climate that have been observed in the recent past and the changes that are projected for this century.

Justifying action: Information on the need to prepare for and respond to the impacts of climate change.

Planned and flexible approaches to adaptation: The benefits of using existing plans and policies to develop a flexible approach to adaptation and information about developing a phased approach to adaptation planning.

Service and infrastructure impacts: Some of the ways that public sector services and infrastructure are likely to be affected by changes in climate.

Policy context: An overview of the climate change adaptation legislative and policy drivers.

Information and support: The resources that are available to help public sector organisations adapt to changes in climate.

THE SCOTTISH CLIMATE CHANGE IMPACTS PARTNERSHIP (SCCIP)

SCCIP aims to increase the resilience of organisations and infrastructure in Scotland to meet the challenges and opportunities presented by the impacts of climate change. SCCIP provides an adaptation support service and information for public, private and voluntary sector organisations.

SCCIP's public sector climate change adaptation workbook provides a set of practical tools and resources to support the development of climate change adaptation work. The workbook can be downloaded from the SCCIP website.

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CLIMATE INFORMATION

"Climate is what you expect, weather is what you get".

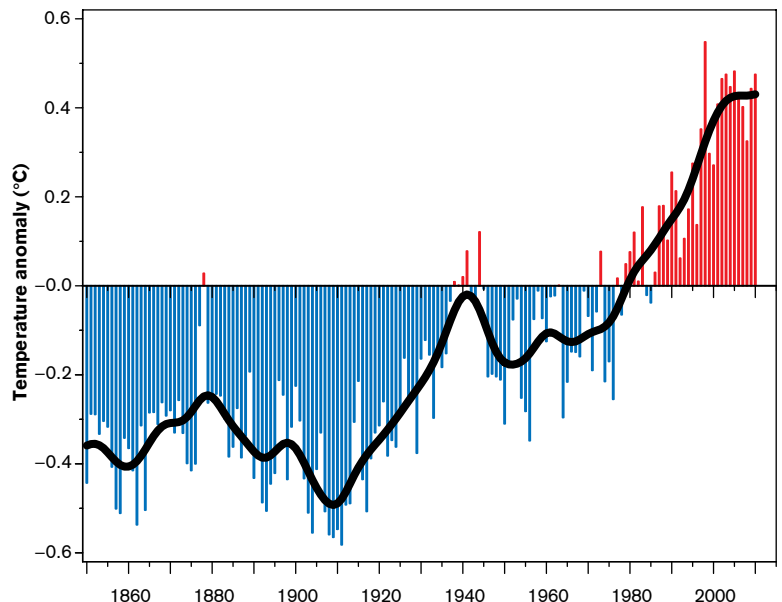
Robert A. Heinlein

'Climate' is a long-term average of weather (usually over 30 years) and trends in these averaged conditions are 'climate change'. The weather we experience day-to-day, or even year-to-year, may appear to be at odds with climate change (for example, recent cold winters). However, we can expect weather to be highly variable over these shorter timescales.

Global Climate Change

The Intergovernmental Panel on Climate Change concluded that the 'scientific evidence for warming of the climate system is unequivocal' (IPCC AR4, 2007). All major reconstructions of global surface temperatures show the warming trend over the last century, with most warming occurring since the 1970's and the ten warmest years on record after 1998 (USA National Aeronautics and Space Administration).

Figure 1: Change in global average temperature 1850 - 2010



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The World Meteorological Organisation has ranked 2010 (alongside 2005 and 1998) as the warmest year on record. 2010 was also characterised by a high number of extreme weather events, including the heatwave in Russia and the devastating monsoonal floods in Pakistan.

Recent Climate Trends in Scotland

The last century has been a period of rapid climate change across Scotland, and this is shown in observational data collected by the scientific community. The Scottish climate has warmed, while altered precipitation patterns have led to drier summers, wetter winters and an increased frequency of heavy rain events. The experience of recent years has shown us that climate change and severe weather events have already impacted many aspects of society, including buildings and property, health, agriculture, transport, water resources and energy demands.

Future Projected Changes in Climate

The UK Climate Projections (UKCP09) are the latest generation of climate information for the United Kingdom for this century. They are based on state-of-the-art climate modelling undertaken by the Met Office Hadley Centre, UK Climate Impacts Programme (UKCIP) and over thirty contributing organisations.

The key climate change trends for Scotland are:

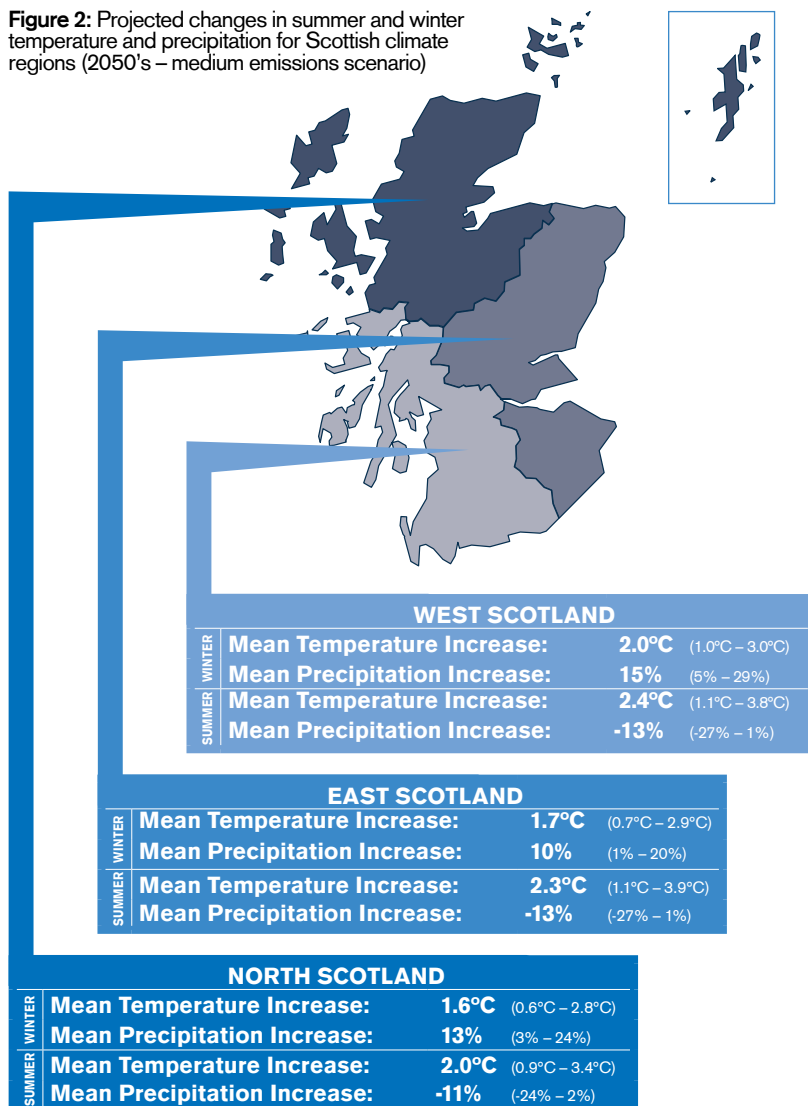
- Hotter, drier summers;
- Milder, wetter autumn and winters.

We can also expect to see:

- Increase in summer heat waves, extreme temperatures and drought;
- Increased frequency and intensity of extreme precipitation events;
- Reduced occurrence of frost and snowfall;
- Sea level rise.

Climate information is provided in UKCP09 for three Scottish 'climate regions' (defined by the Met Office), as shown by Figure 2. The data provided shows projected change in mean temperature and precipitation for winter and summer in the 2050's under a medium emissions scenario.

Figure 2: Projected changes in summer and winter temperature and precipitation for Scottish climate regions (2050's – medium emissions scenario)



*UKCP09 projections provide a range of possible climate outcomes. In Figure 2 the main numbers given in bold are the middle of this probability range, while it is very unlikely that temperature and precipitation will be outside the range given in brackets.

Observed change in Scotland's climate between 1961 and 2004*	
Temperature	Recent temperatures for Scotland are the highest in the records, with average annual temperature increasing 1 °C between 1961 and 2004. This applies across all seasons.
Rainfall	Annual precipitation in Scotland increased by 21% between 1961 and 2004, with an almost 70% increase in winter precipitation for Northern Scotland. Heavy rainfall events have increased significantly in winter, particularly in northern and western regions.
Snow cover	There has been a 25% reduction in winter days with snow cover, with even larger percentage decreases in spring and autumn. The snow season has shortened, starting later and finishing earlier in the year.
Days of frost	Since 1961 there has been a more than 25% reduction in the number of frost days across Scotland, with a downward trend since the 1980s.
Growing season	The growing season is now nearly 5 weeks longer in Scotland (comparing 1961 to 2004), with the greatest change occurring at the beginning of the season.
Sea level**	Sea level at all of Scotland's ports has been rising over the last century, with the rate accelerating over the last two decades (now exceeding 3-4 mm/yr in 9 out of 10 ports).

*The source *A Handbook of Climate Trends Across Scotland (SNIFFER, 2006)* compiles and analyses observed climate data across Scotland over the last century (1914-2004), providing a benchmark of observed climate trends for Scotland.

**Recent analysis of sea level trends by Rennie and Hansom (2010).

JUSTIFYING ACTION

'Preparing for climate change today will reduce the costs and damages of a changing climate and allow the public sector, UK businesses, the third sector and individuals to take advantage of potential opportunities'.

How well prepared is the UK for climate change?

Adaptation Sub Committee, 2010

Changes in climate over the next few decades are unavoidable. Organisations must prepare for the impacts of climate change in order to adapt in the most efficient and cost effective ways possible.

By taking early action to adapt, public sector organisations can:

- Implement actions that will assist in fulfilling the Public Bodies Climate Change Duties required under section 44 of the Climate Change (Scotland) Act 2009;
- Identify services, facilities, locations and communities that are highly vulnerable to climate change impacts and co-ordinate a planned and integrated response to the risks identified;
- Identify cost effective actions that build resilience in response to the negative impacts of climate change;
- Consider and plan for the long term financial implications of managing the risks associated with negative climate change impacts;
- Play a leading role in improving the capacity of stakeholders including partner organisations, businesses, communities and individuals to adapt to the impacts of climate change;
- Ensure that climate change impacts are properly considered as part of business continuity and emergency planning;
- Exploit business opportunities that may emerge as a result of changes in climate; and
- Maintain reputations in delivering quality and effective services despite the challenge of climate change.

The true cost of adapting to climate change is to a large extent unknown. However, there are opportunities for organisations to optimise resources and benefits by considering impacts at an early stage in their decision making processes. This will require strong leadership and capacity building among decision makers and contribute towards a more comprehensive and sustainable approach to managing the effects of climate change.

PLANNED AND FLEXIBLE APPROACHES TO ADAPTATION

There are multiple social and economic benefits to considering climate risks as part of established decision making processes across all service areas and functions. In general organisations should consider:

- **Making use of existing corporate planning and policy processes to avoid negative impacts of climate change.** For example, land use planning policies can be used to restrict development in flood risk areas thus avoiding the need for flood defence schemes in the future. Building design specifications can include requirements that consider the impacts of increased temperatures and extremes in precipitation.
- **Building capacity for change.** The pace and extent of future climate change is uncertain and unprecedented. Research and development, staff training, awareness raising and community engagement have a vital role to play in helping organisations plan for and respond to future changes in climate.

Adaptation planning tools and resources typically suggest adopting a phased approach to developing adaptation work. The phases of work included in SCCIP's climate change adaptation workbook, a practical resource designed for use by public sector organisations are described below:

Getting started: A first look at how changes in climate are already affecting your organisation; involves compiling evidence and information to raise awareness of the need to plan and respond to changes in climate.

Investigating: Identifying and prioritising the climate change impacts that pose the most serious threats to your organisation.

Planning: Identifying appropriate adaptation actions and assigning responsibility for implementation.

Implementing adaptation actions: Overseeing the implementation of a range of actions.

Monitoring and review: Appraising the effectiveness of adaptation actions; considering new evidence and updating actions as appropriate.

FORRES-MOSSET BURN FLOOD PROTECTION SCHEME:

The Forres-Mosset Burn flood protection scheme provides an example of adaptation action taken in response to high risks posed by the current climate and exacerbated by projected changes in climate.

The costs of repeated flooding in the Moray area have run into around £100m over a number of years. The £21 million flood protection scheme was completed in August 2009. It comprises a flood storage reservoir, a flood relief channel at the village of Rafford and minor works in the town of Forres. The scheme protects over 800 homes and businesses from flooding. Within one week of the official commissioning ceremony, the scheme was called into action, saving 350 properties from devastation and the returning £9 million financial benefits for the economy and further intangible benefits.

SERVICE AND INFRASTRUCTURE IMPACTS – IMPORTANT MESSAGES

Buildings need to be fit-for-purpose in a future climate.

Building performance will be challenged by a changing climate, needing to cope with more extreme summer temperatures, intense rainfall events and potential changes in wind and storm patterns. This will require appropriate design and building standards, but also adaptation of existing building stock.

Climate change will affect the health and wellbeing of individuals and communities.

As the climate changes so will the challenges to the health and well-being of individuals and communities across Scotland. In particular, climate change may lead to more disruptive flooding events and an increased occurrence of related impacts in Scotland.

Climate change may damage infrastructure and disrupt transport networks.

The potential for increased flooding, erosion and landslides, storms and wind, and rising sea levels may damage the transport infrastructure and lead to disruption and delays for a large number of users. Organisations need to consider how this might affect the delivery of vital services.

Water environment and resource management will become more complex.

Increases in the variability of river flows, intensity of rainfall events, surface water flooding, sea level rise, seasonality of rainfall and intervals of drought will present numerous and complex challenges.

Rising seas threaten Scotland's coastal communities and infrastructure.

Sea level rise may lead to widespread impacts on Scotland's coast, including potential for increased erosion and coastline retreat. Coastal zone management that accounts for the impacts of rising sea level will be important in managing risk to infrastructure and assets near the coast.

The natural environment has a critical role in responding to the challenges of climate change.

In a changing climate action is required to secure the ecosystem services that support the economy and contribute to the quality of life in Scotland, as well as reducing vulnerability to the impacts of climate change. Local initiatives include the promotion of green networks which include space for natural flood management and wildlife corridors.

The demands on emergency and rescue services will change.

In a changing climate emergency services may need to respond to an increased frequency and severity of flooding, landslide and wildfire events. There may also be changes in social and recreational behaviour that present new challenges to emergency and rescue services. Organisations need to consider whether planning, staff, equipment and resources can respond to changing pressures.

Effective land use and development planning has a critical role in adapting to a changing climate.

Planning can ensure that new developments minimise vulnerability to climate change, as well as improving the resilience of existing infrastructure and communities.

POLICY CONTEXT

The UK Climate Change Risk Assessment

One of the duties under the UK Climate Change Act 2008 is to lay a report before Parliament containing an assessment of the risks to the UK of the current and predicted impacts of climate change to 2100. This report is referred to as the UK Climate Change Risk Assessment (CCRA), and the first CCRA is due in January 2012. This will be the first Government assessment of the risks posed by climate change to things which have social, environment and economic value at UK, national and regional levels. Subsequent reports are timed to be delivered no later than five years after the previous report.

Climate Change (Scotland) Act 2009 and Scotland's Climate Change Adaptation Framework

The Climate Change (Scotland) Act 2009 places a duty on ministers to produce an adaptation programme to address risks identified for Scotland in the CCRA.

Scotland's first Climate Change Adaptation Framework, published in December 2009, is a non-statutory forerunner to the adaptation programme that will be produced following publication of the first CCRA in 2012.

The Climate Change Adaptation Framework provides a coordinated approach to ensuring that Scotland understands the risks and opportunities that changes in climate will present. The framework is underpinned by twelve sector action plans that will mainstream climate change adaptation actions across policy areas and build capacity throughout government and among partner organisations.



ADAPTATION FRAMEWORK SECTOR ACTION PLANS

Agriculture

Biodiversity and Ecosystem Resilience

Business and Industry

Emergency and Rescue Services

Energy

Forests and Forestry

Health and Wellbeing

Marine and Fisheries

Spatial Planning and Land Use

The Built Environment

Transport

Water Resource Management

Public Bodies Climate Change Duties

Part 4 of the Climate Change (Scotland) Act 2009 places duties on public bodies (defined as a Scottish public authority within the meaning of Section 3(1)(a) of the freedom of information (Scotland) Act 2002 (as amended)) relating to climate change. These duties came into force on 1st January 2011. The adaptation duty specifies that public bodies must, in exercising their functions, act in the way best calculated to deliver any statutory adaptation programme.

Whilst public bodies are not formally required to help deliver Scotland's adaptation framework it should be noted that:

'Scottish Ministers would strongly advise public bodies to consider the risks and opportunities climate change presents to their business continuity now and how, in delivering their functions, they may build broader resilience to change in Scotland'.

Public Bodies Climate Change Duties: putting them into practice, Scottish Government, 2011

The other duties require that public bodies act in the way best calculated to contribute to the delivery of emissions targets set in or under the Climate Change (Scotland) Act 2009, and in a way that is considered most sustainable.

Adapting to climate change will be a challenging and ongoing process and is a new area of work for many organisations. What is key from the recent and emerging policy context is that there are substantial benefits to be gained from working together to better understand the likely impacts of climate change. This will ensure that planned and effective action is taken to minimise threats and make the most of opportunities.

INFORMATION AND SUPPORT

Scottish Climate Change Impacts Partnership (SCCIP)

SCCIP provides information, tools, training and events aimed at helping organisations understand and respond to the challenges and opportunities presented by climate change.

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SCCIP benefits from the advice and expertise of a wide range of partner organisations all of which provide extensive information in support of climate change adaptation:

- UK Climate Impacts Programme (UKCIP)
www.ukcip.org.uk
- UK Climate Projections
<http://ukclimateprojections.defra.gov.uk/>
- Scottish Environment Protection Agency (SEPA)
www.sepa.org.uk
- Sustainable Scotland Network (SSN)
www.sustainable-scotland.net
- Scottish Government
www.scotland.gov.uk/climatechangeadaptation



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