USING AN LCLIP TO ASSESS A LOCAL AUTHORITY'S VULNERABILITY TO CLIMATE CHANGE

Case study: Aberdeen City Council

ABERDEEN CITY COUNCIL

Between 2008 and 2013 Aberdeen City Council was affected by 59 weather related incidents, ranging from flooding on the roads and fallen trees during stormy weather, to school closures caused by snow and ice. Using a Local Climate Impacts Profile (LCLIP), the Council assessed its vulnerability to weather events, and examined how the findings can be used to increase their resilience to future extreme weather. This case study explains how this process was completed using a six stage approach.

How will the climate change in East Scotland?

UK Climate Projections 2009 data for East Scotland suggests that, under a medium emissions scenario, by the 2050s the region may see:

- An increase in summer mean temperatures of around 2.3°C, and of winter temperatures of around 1.7°C;
- A 10% increase in winter mean precipitation and a 13% decrease in summer mean precipitation.

Source:http://ukclimateprojections.metoffice.gov.uk

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What is an LCLIP?

A Local Climate Impacts Profile is a tool developed by UKCIP (an organisation set up to help society adapt to climate change) to understand how the current weather affects an organisation. The process involves researching past weather events through newspaper archives and interviews with key personnel.

Why do an LCLIP?

Working through the LCLIP process raises awareness of the impacts of severe weather events on the Council. In addition, it increases the understanding of where the Council needs to adapt its existing strategies, policies, plans and procedures to meet the changes. The LCLIP process has also helped to inform the Council's Climate Change Strategic documents which includes an Adaptation Plan.

The LCLIP process

The LCLIP approach is split into six stages (Figure 1) and was completed over a 9 month period.

1. **Purpose and objectives:** Examine recent weather events and the Council's vulnerability to future extreme weather.

2. **Media review:** A range of media sources were used to identify severe weather events that affected Aberdeen City, as well as the impact, consequences and response to these events. Media searches were carried out using terms such as extreme weather, heavy rain, snow, storms and flooding. Online resources were also used such as news websites and newspapers on microfiche in local libraries. The collected data was then collated in a spreadsheet that was available from the UKCIP toolkit.

Aberdeen City Council is taking action on climate change as part of the Adaptation Learning Exchange (ALE). The ALE was set up by Adaptation Scotland to support the public sector plan for the impacts of a changing climate.

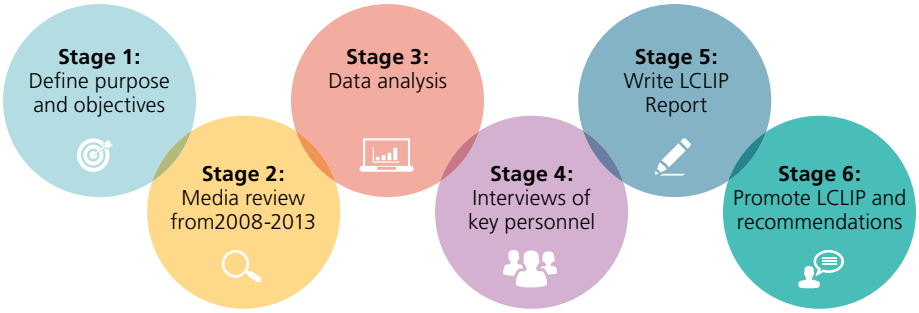

Figure 1. Aberdeen City Councils LCLIP process based on UKCIP's LCLIP

3. **Data analysis:** The data was analysed to highlight the services most affected by the Council. It also identified who to interview on the subject.

4. **Interviews:** Staff conducted interviews with officers across the Council in order to gather further information on the impact and consequences of extreme weather on Council services.

5. **Write report:** Qualitative and quantitative data collated from the media review and interviews were used to write the LCLIP report and develop key recommendations.

6. **Promote LCLIP:** The report was promoted widely to raise awareness and engage with key stakeholders on climate change adaptation.

The LCLIP findings

The most frequent severe weather events that occurred between 2008 and 2013 were frost, ice and/or snow followed by rainfall and flooding.

Other key issues identified were:

- Damage on trees from stormy weather impacting on roads, arboricultural services and grounds maintenance.
- Heavy rain causing flooding, erosion of paths and disruption to grounds maintenance work.
- School closures during snowy/icy conditions.
- Clearance of roads, road repairs and availability of salt during winters with severe snow and ice affecting the roads team and potentially all Council services through loss of staff time.
- Cancellation of events due to snow, wind and torrential rain.
- Building maintenance during snow, rain and high winds.
- Waste collection during excessive snow, rain and wind.

Recommendations

Our top learning points and recommendations for those wishing to complete an LCLIP would be to:

1. Record data better. To investigate developing a system for all services to record extreme weather events and impacts. e.g. Type of event, impacts, service response, complaints, closures, costs and loss of service provision.

2. Form a climate change adaptation subgroup or similar.

3. Develop an Adaptation Plan.

4. Raise awareness of the impacts of severe weather and the need for climate change adaptation throughout the city and sectors.

5. Share information on climate risk and adaptation strategies between Council services and other public sector organisations to increase knowledge and improve responses.

6. Review strategies, policies, plans, projects and processes to ensure climate change adaptation is addressed and integrated.

7. Identify adaptation training needs.

Next steps

Work is now taking place to develop an Adaptation Plan, which will sit alongside a Sustainable Energy Action Plan, to address mitigation and adaptation measures in Aberdeen. These two plans will replace the Council's Climate Change Action Plan (2002).

Working through the LCLIP process is a starting point to informing future climate change adaptation work and building staff's understanding of the need to increase our resilience and safeguard our services.

Further information

For more information about this project, please contact:

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For details of the LCLIP process, visit the UKCIP website at:
www.ukcip.org.uk/wizard/lclip

Adaptation support

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www.adaptationscotland.org.uk

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ACHIEVING A CLIMATE READY BIOSPHERE THROUGH PARTNERSHIP WORKING

GALLOWAY AND SOUTHERN AYRSHIRE BIOSPHERE

Case study: Galloway and Southern Ayrshire Biosphere

This case study describes how the partners of the Galloway and Southern Ayrshire Biosphere identified the challenges and opportunities presented by a changing climate, and the method they used to create and share a positive vision for how the communities, the natural environment and economy can adapt and thrive.

How will the climate change in West Scotland?

UK Climate Projections 2009 data for West Scotland suggests that, under a medium emissions scenario, by the 2050s the region may see:

- An increase in summer mean temperatures of around 2.4°C, and of winter temperatures of around 2.0°C;
- A 15% increase in winter mean precipitation and a 13% decrease in summer mean precipitation.

Source:http://ukclimateprojections.metoffice.gov.uk

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What is a Biosphere?

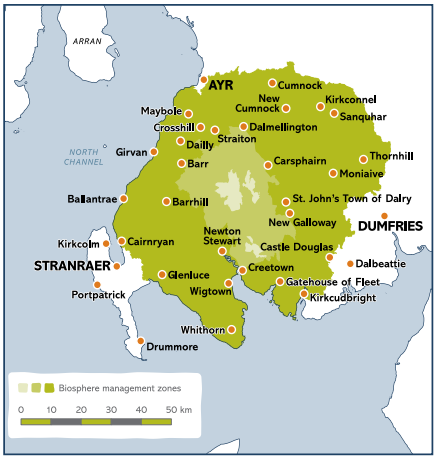
Biosphere Reserves, usually referred to as Biospheres are places with world-class environments that promote sustainable development based on local community efforts and sound science. They are established through the UNESCO Programme on Man and the Biosphere and must be nominated by a national government. The Galloway and Southern Ayrshire Biosphere, designated in 2012, was a first for Scotland. It is one of 651 Reserves in 120 countries. It has three main functions; to conserve the biodiversity of the local environment, to pioneer more sustainable ways of living, and to support a better understanding of nature and global issues.

Putting climate change impacts on the agenda

Severe weather impacts are not new to the region covered by the Galloway and Southern Ayrshire Biosphere, and the expected impacts of climate change will affect all areas of life in the area. Following one particular weather event, officers felt that the Biosphere had the ability to act as a pilot area, to identify the possible effect of a changing climate. They also recognised the role the Biosphere could take in raising awareness, engaging with the community, gaining stakeholder buy-in, and supporting the role of the Biosphere in pioneering more sustainable ways of living alongside a changing climate. Biosphere officers contacted Adaptation Scotland to develop a project to raise awareness of the need to adapt to climate change, and build capacity for joint planning and action.

A key characteristic of the Biosphere is to bring together people and organisations across a geographical area. Taking a partnership approach was crucial to achieving this, developing a shared vision and identifying possible actions.

Galloway and Southern Ayrshire Biosphere is taking action on climate change as part of the Adaptation Learning Exchange (ALE). The ALE was set up by Adaptation Scotland to support the public sector plan for the impacts of a changing climate.



The process

A series of three workshops were held to take participants on a journey from recognising and understanding what climate change is, through to options for adaptation to counter threats and making the most of the opportunities.

The three workshops were:

- Introducing Climate Change and Adaptation
- Showcasing Action and Identifying Opportunities
- Our Shared Vision and Next Steps

Who was involved?

The Biosphere board provided important leadership and endorsement of the project and the Biosphere staff played a crucial role in involving a wide range of organisations, businesses and communities in the project. Participants included public sector organisations, local community groups, businesses and academics.

Adaptation Scotland provided support throughout the project, working with the Biosphere to design the workshops and build momentum through creating a Climate Ready Biosphere vision and setting up a Task Group to develop an action plan.

Why is this important for climate change adaptation?

Partnership working is crucial to a climate ready future for the Biosphere. This project demonstrates that partners with diverse backgrounds and interests can work together to identify shared challenges and opportunities and make progress in taking action.

The importance of climate change and adaptation in biospheres is reflected in a proposal going forward to the World Congress of Biospheres to take place in Lima in 2016. This will make it a fourth objective for all biospheres worldwide.

What has changed as result of this process?

The impacts of climate change in the Biosphere are now more widely understood with challenges and opportunities identified, and a positive vision of a climate ready future is established.

An action plan has been developed to go alongside the vision. Whilst there is still a long way to go in resourcing and implementing actions, a strong start has been made which would not have been possible without the engagement and buy-in developed through the project.

Recommendations

1. Involve a broad cross section of organisations and individuals to help identify adaptation challenges and opportunities, and establish a clear vision for the future.

2. Use recent experiences of the impacts of severe weather events on the region to recognise that climate change will affect all areas of life in the Biosphere.

3. Acknowledge good work that's already happening, for example, the workshops included lots of examples of how partners are contributing towards increased climate resilience, such as the success of community resilience in Dumfries and Galloway.

4. Adaptation Scotland's input was valuable, their expert facilitation helped to keep the process moving forward, looking for positive solutions and not dwelling on the negatives.

Next steps

The vision for a Climate Ready Biosphere and accompanying action plan will be launched later this year.

One of the first priorities will be to establish a baseline from which to measure progress against our vision and action plan.

Information about this project will be shared with Biospheres worldwide, demonstrating Scotland's leadership in adapting to climate change and, inspiring others to do the same.

Further information

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For details see:
www.gsabiosphere.org.uk
www.adaptationscotland.org.uk/3/192/0/Climate-Ready-Biosphere.aspx

Adaptation support

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STRATEGIES FOR EMBEDDING ADAPTATION

Clackmannanshire Council

Case study: Clackmannanshire Council

Clackmannanshire Council have taken a number of initiatives to make progress with climate change adaptation. This case study looks at how they have aligned adaptation with existing strategies and policies, engaged and collaborated across the organisation, and embraced organisational learning and change.

How will the climate change in East Scotland?

UK Climate Projections 2009 data for East Scotland suggests that, under a medium emissions scenario, by the 2050s the region may see:

- An increase in summer mean temperatures of around 2.3°C, and of winter temperatures of around 1.7°C;
- A 10% increase in winter mean precipitation and a 13% decrease in summer mean precipitation.

Source:http://ukclimateprojections.metoffice.gov.uk

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Aligning adaptation with existing strategies and policies

The Council's formal and structured climate effort has focussed primarily on reducing emissions rather than adapting to climate change. This project sought a more formal adaptation remit, while continuing preparatory work mandated by a Sustainability and Climate Change Strategy review.

The work focused on pulling different strands together to build adaptation into business as usual. This reflects the approach in the overarching Sustainability and Climate Change Strategy to embed climate change actions in people's day to day work, rather than as a separate consideration.

One route to this is providing information to enable staff to incorporate climate considerations into existing business planning and risk assessment processes. A risk "bank", which brings together information on severe weather incidents with impacts and remedial actions, is being developed to help with this. Adaptation is also being built into broader *'Sustainable Ways of Working'* guidance, and into proposed changes to the sustainability test to accompany Council reports.

Engaging and collaborating across the organisation

Through a number of climate change initiatives, the sustainability team have engaged with colleagues in emergency planning, risk management, development planning and corporate planning. They are now seeking to work with teams within Development and Environment Services to pilot the risk bank.

Clackmannanshire Council is also in the early stages of working with external partners both through community planning partnerships, and landscape and biodiversity partnerships.

Clackmannanshire Council is taking action on climate change as part of the Adaptation Learning Exchange (ALE). The ALE was set up by Adaptation Scotland to support the public sector plan for the impacts of a changing climate.

Strategies for Embedding Adaptation

Encouraging organisational learning

The Council has increased its understanding of the adaptation process through using tools and resources and working in partnership. They have engaged in aspects of adaptation both consciously, such as through its involvement in Adaptation Scotland's Adaptation Learning Exchange, developing a Local Climate Impacts Profile (LCLIP), and factoring climate change into the Local Development Plan, and also simply as a matter of good practice, through flood risk management and emergency planning.

Staff in the sustainability team have also used Adaptation Scotland's "Five Steps to managing your climate risks" guidance to provide structure to their work to and to gauge progress. Although only four of the fifteen sub steps of the Five Steps have been completed at this point, significant work has been done on all of them and also on all of the Policies and Proposals in the Scottish Climate Change Adaptation Programme for which local authorities are listed as responsible bodies.

Embracing organisational change

Within the Council, the emphasis is shifting from "environment" to "people". Thus, while there is still a need to understand the meteorological and hydrological conditions that led to an old people's home being flooding, the emphasis now is on how those people have been affected, and how to reduce the harmful effects.

Impact upon communities is the overriding consideration as the Council works with partners to address upstream land use proposals to minimise future flood risk. It is therefore necessary to adjust our ways of communicating on climate change adaptation, to move away from the climate science and focus more on how severe weather events are affecting communities.

Top learning points

1. Rather than developing a standalone set of climate change actions, the Council is asked to re-think the way it works. This is a big ask. Everything to make that process easier and more relevant to colleagues' day jobs is of value.

2. All public bodies are under financial pressure and there is a narrative that public interest in climate change has dwindled. Making the case for adaptation in terms that are relevant to colleagues and partners is paramount, such as presenting the case in relation to the Council's Priority Outcomes rather than just as an environmental issue.

3. As staff leave and are not replaced, there is a risk of losing knowledge in the organisation on previous weather events, vulnerabilities and workarounds that are not always systematically documented.

4. With climate change, what would once have been exceptional weather events are becoming normal. As such, it is increasingly important to incorporate planning for them into normal business planning rather than emergency planning.

5. In addition to the Council's own actions, plans need to consider how suppliers or services that the Council depend upon, and the customers or service users, might be affected.

Next steps

Work on climate change adaptation is an ongoing process. The sustainability team will continue its involvement in the Adaptation Learning Exchange, setting and reviewing their goals periodically. The current objectives that have been identified and will be mandated by the Corporate Management Team are:

1. Establish robust and fit for purpose governance and leadership.

2. Finalise a climate adaptation framework that reflects the requirements of the Five Steps.

3. Review business/operational plans to take account of climate risks and impacts for a pilot group of services/teams.

Further information

For more information about this project, please contact:

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Adaptation support

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EMBEDDING CLIMATE CHANGE ADAPTATION ON THE RISK REGISTER

Case Study: Stirling Council

Stirling Council has included "Failure to comply with the adaptation requirement of the Climate Change (Scotland) Act 2009" on its Corporate Risk Register. This case study looks at the steps the Council took to include the risk and the benefits of the approach.

How will the climate change in East Scotland?

UK Climate Projections 2009 data for East Scotland suggests that, under a medium emissions scenario, by the 2050s the region may see:

- An increase in summer mean temperatures of around 2.3°C, and of winter temperatures of around 1.7°C;
- A 10% increase in winter mean precipitation and a 13% decrease in summer mean precipitation.

Source:http://ukclimateprojections.metoffice.gov.uk

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What steps were taken to add climate change to the risk register?

Local authorities in Scotland have a duty under the Climate Change (Scotland) Act 2009 (s 44) to reduce carbon emissions, adapt to climate change and endeavour to act sustainably. This was the starting point for discussion between the Sustainability Officer and Resilience and Risk Manager in Stirling Council to formulate a risk around climate change adaptation. Follow-up conversations were held with the Head of Governance and Resources and the Head of Environment Services who were separately responsible for presenting the Strategic Risk Register to the Council Management Team, and for having the new climate change risk within their directorate.

The next step was to develop a Climate Change Adaptation Strategy that built climate change adaptation into the standard protocol of treatment actions on the risk, controls, and using the strategy action plan as a series of further actions. This was supported by the Council Management Team, and subsequently reported to the Audit Committee.

Who was involved?

Including a new risk on the risk register is a formal process. The Resilience and Risk Manager and the Sustainability Officer in Stirling Council led the process, with approval and support for the new risk being signed off from their managers, the Head of Governance and Resources and Head of Environment Services. The Council Management Team were responsible for ratifying the risk in the Strategic risk register, and this is reported to the Audit Committee.

Stirling Council is taking action on climate change as part of the Adaptation Learning Exchange (ALE).
The ALE was set up by Adaptation Scotland to support the public sector plan for the impacts of a changing climate.

What has changed as a result of this project?

Climate change adaptation is now considered corporately as a strategic risk. This ensures that policies, plans and procedures are developed to have a positive climate change adaptation impact and enable progress with future adaptation measures. Risk is reported in all committee reports and scrutinised by Council Management Team and Audit Committee.

Links to other strategic risks are identified and adaptation is considered as a specific component of a wider sustainability risk.

Adapting to climate change includes planning to reduce the risks while identifying and capturing opportunities. Using a robust risk management framework to consider risks and opportunities provides a systematic approach throughout the organisation.

What are the benefits?

The Council Management Team's scrutiny of the risk register gives climate change adaptation a profile which it would not otherwise achieve. Progress is monitored by the Resilience and Risk section, which is part of Corporate Operations.

The impact of failure to adapt is quantified and rated and our adaptation strategy acts as a control on the risk. The strategy implementation action plan is considered as a series of treatment actions to further mediate the risk and progress on implementation of actions managed via strategic risk management structure. This ensures that actions are assigned target dates for completion and responsible officers are identified. This helps embedding adaptation and ensures that progress is effectively monitored and managed.

Recommendations

1. Buy-in within the organisation is crucial. Adaptation is a 'hard sell' in the current economic climate and it is therefore essential that those who can take matters forward are engaged.

2. An adaptation task group is a good way to consider what the organisation is already doing and to raise awareness. The task group also looked at what others have done/are doing. Much of the work already being done to adjust services is climate change adaptation but not considered as such. Identifying where climate is having an impact can be used to 'rebadge' current initiatives so the task seems less onerous and the starting point is not zero.

3. Consider adaptation as part of other projects and not as a separate enterprise.

Next steps

Work is now underway to get buy–in and input from potential partners in business and industry. We are also working more with the community to ensure that adaptation is considered as part of the wider community engagement strategy.

Further information

For more information about this project, please contact:

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Adaptation support

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ASSESSING AND ADAPTING TO THE IMPACT OF PAST WEATHER EVENTS IN THE HORTICULTURE SECTOR

Royal Botanic Garden Edinburgh

Case study: Royal Botanic Garden Edinburgh

Horticulture and visitor services staff at the Royal Botanic Garden Edinburgh (RBGE) and its Regional Gardens are already adapting to climate uncertainty – dealing with floods, prolonged periods of low rainfall, unseasonable temperatures and high winds. This case study looks at the process used to investigate the impact of weather events across the different gardens and how this can be used to best deal with projected climate change.

Scotland's changing climate

We are already seeing evidence of Scotland's climate changing. Over the last few decades our climate has warmed, sea-levels have risen, rainfall patterns have changed and we have been impacted by extreme weather events. These changes are projected to continue in the decades ahead.

The UK Climate Projections 2009 data suggests that, for Scotland:

- the average climate will become warmer throughout the year;
- rainfall is likely to become more seasonal with
  - a typical summer becoming drier, and
  - a typical autumn and winter becoming wetter; and
- sea levels will rise.

We can also expect to see:

- increase in summer heat waves, extreme temperatures and drought;
- increased frequency and intensity of extreme precipitation events; and
- reduced occurrence of frost and snowfall.

Source: ukclimateprojections.metoffice.gov.uk

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The process

1. **Getting people on board**
   The first action was to meet with the garden curators to explain the aim of the project, how it would be of value, and the output that would be produced.

2. **Gathering information**
   Next, visits to each garden were arranged to interview key personnel and gather information on:

   - observed impacts of current weather conditions and extreme weather experienced, and any adaptive actions taken as a result;
   - risks related to weather or climate change that have been identified;
   - potential opportunities arising from a changing climate; and
   - records of garden closures to visitors and staff and historic weather data.

3. **Site visit**
   At each garden, the curator also did a walk round to explain the garden features and see weather impacts and adaptive actions first-hand. Visitor services staff, who are well placed to see the impact of weather events on visitors, were also consulted.

The Gardens

The Royal Botanic Garden Edinburgh was established in 1670.

During the 20th century it acquired three Regional Gardens. The four gardens experience quite different weather conditions; Inverleith in Edinburgh is the driest, Dawyck the coldest, Benmore the wettest and Logan the mildest. Together they represent one of the world's largest living collections of plants.

Across the different Gardens, most kinds of extreme weather have been experienced.

RBGE has presented this information as part of the Adaptation Learning Exchange (ALE).
The ALE was set up by Adaptation Scotland to support the public sector plan for the impacts of a changing climate.

The findings

1. Plants

The iconic Redwood Avenue of trees at Benmore gardens (pictured) is at risk of waterlogging due to inadequate drainage in intense rain. The waterlogged soil causes physical stress to the trees due to root death. No air spaces are left in the saturated soil and roots literally drown.

All the gardens have seen trees lost or damaged in storms. This provides both challenges, when specimens are of particular conservation importance, and opportunities for planting new species.

Mild winters increase the risk of pests and diseases. Impacts include an increase in aphids such as green spruce aphid on *Picea* (spruce), and soft scale, previously considered a glasshouse pest, on rhododendron.

2. People

As the climate changes, the gardens have to close more frequently due to severe weather. This has a number of impacts:

- Loss of work hours; as staff are also excluded from the garden for safety reasons.
- Loss of income; for example at Logan the Potting Shed Bistro has to close if the garden is closed due to weather.
- Disappointed visitors.
- Staff time to clear up after a storm; for example at Dawyck the removal of one fallen Noble fir took 200 man hours as machinery could not be used safely due to its location.

3. Infrastructure

The increase in heavy rainfall events has made the use of bark and grass paths impractical. All the gardens are now replacing these paths with gravel, or other porous paths together with improved drainage measures.

Storm damage has resulted in multiple broken panes of glass in the glasshouses at Inverleith, in Edinburgh (pictured), leaving tender plants exposed to the elements.

Adaptation measures

Adaptation is site specific. The four different sites allow RBGE to draw on a wide range of experience in dealing with different weather events and site impacts. Some adaptation measures include:

- Planting a mix of species. This increases resilience to pests and diseases, and provides a more effective windbreak and structure to shelter belts.
- When re-designing garden infrastructure, locate facilities such as visitor centres and cafes outside the pay zone to provide access even if the garden is closed.
- When planning staff resource and time, include allowance for clear-up and remedial work following extreme weather events.
- Replacing paths with gravel or other porous materials.
- Providing additional drainage and factoring in staff time for keeping drains clear.
- Researching glasshouse structures and glazing systems that are less susceptible to wind damage.
- Adopting a zero tolerance maintenance procedure to glass damage such as cracks, and keep more glass on site to reduce repair time.

Next Steps

- Compare anecdotal evidence about changing weather with actual weather records from the weather stations at each garden.
- Highlight the opportunities, such as being able to grow new species in a milder future climate.
- Produce maps of the gardens with a 'trail' showing adaptation features, and develop interpretative signage to explain climate impacts and adaptation measures to visitors.

Recommendations

1. Gain high-level support for initiatives
2. Consider the aims of the organisation and how this process can add value, for example communication and engagement.
3. Talk to as many personnel as possible, and listen to their experiences.

Further information

For more information about this project, visit **http://journals.rbge.org.uk/index.php/rbgesib/article/view/44**

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INCLUDING ADAPTATION IN CAPITAL MAINTENANCE PROGRAMMES

Case study: Scottish Water

As climate change alters rainfall patterns and brings more heavy downpours, flood risk is likely to increase in the future. This case study looks at how Scottish Water has addressed the impacts of flooding on the River Spey through incorporating adaptation projects in their five year capital maintenance programme.

Scotland's changing climate

We are already seeing evidence of Scotland's climate changing. Over the last few decades our climate has warmed, sea-levels have risen, rainfall patterns have changed and we have been impacted by extreme weather events. These changes are projected to continue in the decades ahead. The UK Climate Projections 2009 data suggests that, for Scotland:

- the average climate will become warmer throughout the year;
- rainfall is likely to become more seasonal with a typical summer becoming drier, and a typical autumn and winter becoming wetter; and
- sea levels will rise.

We can also expect to see:

- increase in summer heat waves, extreme temperatures and drought;
- increased frequency and intensity of extreme precipitation events; and
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Source: ukclimateprojections.metoffice.gov.uk

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supporting climate change resilience

How flooding affects infrastructure and water quality

River flows in the River Spey can be relatively low during dry weather. During periods of snowmelt and heavy rain there is a significant rise in the river level onto the flood plain. Scottish Water's aim was to improve the level of treatment to protect and improve water quality, and at the same time make the infrastructure resilient to an increased risk of flooding. With climate change likely to alter rainfall patterns and bring more heavy downpours, flood risk is expected to increase in the future.

What we did

We worked with Local Authority planners and the Scottish Environment Protection Agency (SEPA), and consulted with various stakeholder groups and the Cairngorm National Park Authority. This identified development growth pressures and flood risk areas as an issue throughout the River Spey catchment. This was the basis for planning a series of upgrades to the treatment plants at Newtonmore, Kingussie, Aviemore, Boat of Garten, Grantown and Nethybridge, as well as modifications to two pumping stations.

Control panel for wastewater pumping station raised above the flood level at Aviemore.

Scottish Water has presented this information as part of the Adaptation Learning Exchange (ALE).
The ALE was set up by Adaptation Scotland to support the public sector plan for the impacts of a changing climate.

This picture shows the Boat of Garten site with the new works on the left and the old septic tank site in the flooded area, beyond the fence in the middle.

Climate change was a focus in this planning:

- Detailed flood risk assessments were carried out to identify the areas prone to flooding.
- Treatment plants were sited to avoid the impact of increased flood events
- Resilience to flood risk was built into the upgraded facilities.
- A variety of methods were used to adapt the sites to future flood risk. This included
  - using bunds to prevent flood water reaching the treatment plant,
  - building up the land surrounding the plant, and
  - creating compensatory storage for flood waters at other points upstream.

Noting the key findings from the climate projections, the improvements also took into account the possibility of longer periods of dry weather. This presented challenges for the level of treatment required.

What has changed as result of this process?

The upgraded treatment plants and pumping stations can continue to operate and treat wastewater even when the River Spey bursts its banks. The work has both increased the flood resilience of the assets and improved their capability to protect the Special Area of Conservation of which the River Spey comprises a large part.

Recommendations

- Engage and collaborate with a wide range of organisations to explore options and opportunities
- Consider key findings from the climate projections to assess future business risk
- Review existing strategic plans and policies for exposure to climate-related risks and identify opportunities for adaptive strategies to be incorporated into them and their associated processes.

Next steps

- Complete work with Local Authorities on catchments at risk of flooding and agree a prioritised strategy for flood mitigation measures.
- Incorporate climate change scenarios when designing all new treatment plants and upgrading existing ones.
- Use the outcomes from the climate risk assessment to inform future investment decisions.

Further information

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Adaptation support

The Adaptation Learning Exchange (ALE) is a programme to support organisations with adaptation planning, enabling them to address common adaptation challenges and explore opportunities. For more about the ALE, visit our website or contact **sophie@sniffer.org.uk**

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Adaptation Scotland
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