

The benefits of integrating climate adaptation and mitigation

SCIS is a capability and capacity-building programme for local authorities to reduce area-wide emissions across Scotland. Yet reducing emissions is only one part of the climate action journey.

As Scotland's climate continues to change, it is equally important to ensure that infrastructure, services, and communities are prepared for increasing risks such as flooding, overheating and sea-level rise.

The public sector plays a key role in delivering adaptation action in Scotland. The Climate Change (Scotland) Act 2009 and the Public Bodies Climate Change Duties require public bodies to help deliver the National Adaptation Plan (SNAP3) and report progress annually.

This briefing – written by Emma Yule in collaboration with SCIS – emphasises the need to integrate climate adaptation and mitigation measures when delivering climate interventions across sectors and scales.



Why do we need to adapt?

Scotland's climate is already changing:



Temperatures are increasing, with more frequent and intense heatwaves



Rainfall patterns are shifting, with heavier rainfall events and increased flood risk



Sea levels are rising



Weather will remain variable and may become more unpredictable

Even under ambitious emissions reductions, climate impacts will continue for decades. Adaptation is therefore essential to protect communities and critical services.

What is Climate Risk and Resilience?

Climate Risk

Climate risk arises from the interaction between a climate hazard (such as flooding or heatwaves), exposure (who or what is in harm's way), and vulnerability (how severely those exposed are affected). The same hazard will not impact every community, individual or organisation in the same way. The diagram below shows the nexus between hazard, vulnerability and exposure that makes up 'Climate Risk'.

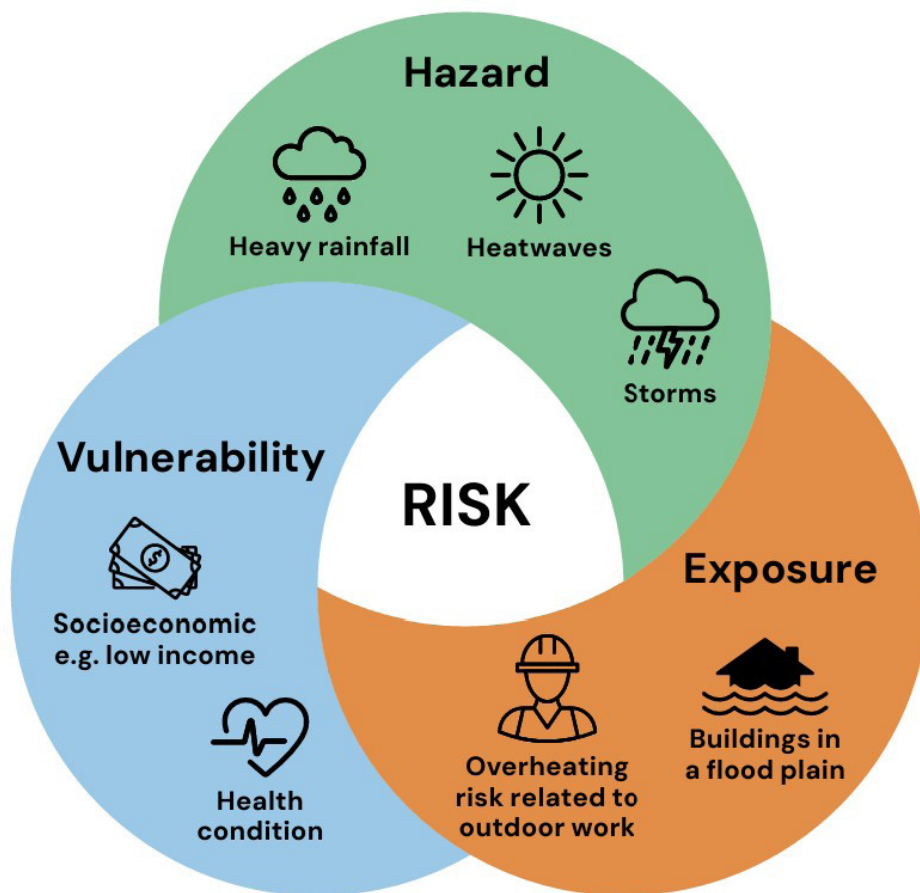


Diagram from Adaptation Scotland's 'Starter Pack.'

Climate Resilience

Climate resilience is the long-term capacity of systems, communities and infrastructure to absorb shocks, recover and adapt to changing climate conditions.





Why integrate adaptation and mitigation?

Mitigation reduces greenhouse gas emissions. Adaptation reduces the risks and damages of climate change. Integrating climate adaptation and mitigation helps ensure that emissions reduction measures are resilient to current and future climate impacts.

Even if net zero targets are met, warming and related impacts will continue for decades. Designing mitigation projects

with adaptation in mind helps ensure services remain functional under current and future climate conditions.

The table below outlines high-level adaptation considerations for climate mitigation shifts across sectors. On the left is the sector, defined using ClimateView's Transition Element framework. You can find out more about the [framework here](#).

Transition Element Sector	Mitigation shifts	Adaptation considerations
Transport 	<ul style="list-style-type: none"> Increased remote working Increased active travel Shift to public transport Shift fuel source Route optimisation Improved load factor 	<ul style="list-style-type: none"> Increased reliability of road, rail and active travel networks during extreme weather (e.g. improved drainage and surface design) Reduced overheating risks in home-working environments (e.g. through risk assessment) Heat resilient active travel infrastructure (e.g. shade, tree cover, water access)
Industry 	<ul style="list-style-type: none"> Low carbon construction 	<ul style="list-style-type: none"> Industrial sites and equipment designed to withstand flooding, overheating and supply chain disruption Climate risk assessments embedded in capital investment decisions
Buildings 	<ul style="list-style-type: none"> Energy efficient buildings Shift fuel source (e.g. renewable biofuels) Shifts to District heating 	<ul style="list-style-type: none"> Buildings designed or retrofitted to reduce overheating risk (e.g. ventilation strategies) Flood-resilient design and sustainable drainage systems Avoidance of maladaptive responses (e.g. over-reliance on air conditioning increasing emissions)
Energy 	<ul style="list-style-type: none"> PV on rooftops Improved grid electricity 	<ul style="list-style-type: none"> Security and continuity of energy supply during storms and extreme weather Distributed and flexible systems to improve resilience to climate shocks

What are the benefits of integrating adaptation and mitigation?



Building in resilience to improve long-term cost-effectiveness

Designing mitigation interventions to withstand current and future climate impacts reduces the risk of asset failure, retrofit costs, and the additional greenhouse gas emissions associated with retrofitting.



Maximised co-benefits

Integrated, holistic approaches can help deliver outcomes across climate mitigation, climate adaptation, and wider policy priorities such as health, nature, and biodiversity.



Reduced unintended consequences

Considering trade-offs early helps avoid maladaptation and carbon lock-in (e.g. increased reliance on air conditioning during heatwaves).



Stronger funding cases

Bundling mitigation and adaptation measures can unlock larger funding opportunities and improve value-for-money arguments.



Enhanced collaboration and system change

Considering adaptation and mitigation together can encourage collaboration and partnership working across sectors and local authority boundaries, delivering system-level change across transport, energy and land use systems.

How can we integrate adaptation and mitigation in practice?

Asking how a mitigation intervention interacts with the components of climate risk (hazard, exposure, and vulnerability) can help identify where resilience measures should be implemented.

You can see this in the example below, focusing on the key climate transition of increasing the proportion of walking and cycling in a given area.

Sector: **Transport**

Transition Element: **Increased Proportion of Walking and Cycling**

Q1 How might this intervention/transition element be affected by climate change impacts?

- Routes may be disrupted by flooding, storms or extreme heat
- Heavy rainfall may damage surfaces and reduce usability
- High temperatures may reduce comfort and safety for walking or cycling

Q2 How might this intervention change how people or places are exposed to climate impacts?

- Increased direct exposure to heat and heavy rainfall during travel
- Reduced exposure to air pollution due to lower car use may improve health

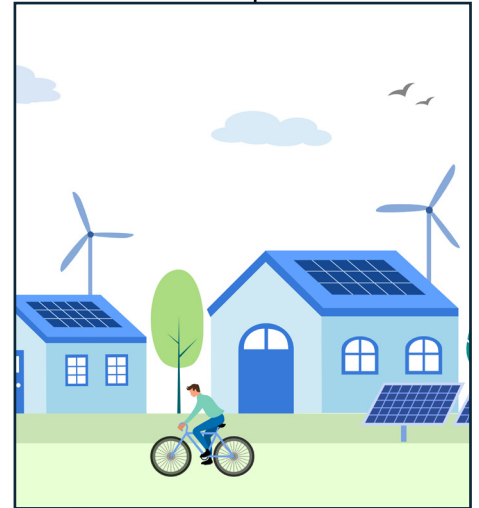
Q3 How might this intervention reduce or exacerbate inequalities?

- Unequal access to safe, climate-resilient routes across areas, potentially reinforcing spatial inequalities
- Greater risks for vulnerable groups during extreme weather
- Potential cost savings for lower-income households if infrastructure is accessible

Conclusion

Reducing emissions is only one part of Scotland's climate response. Infrastructure, services and communities must also be prepared for the increasing climate risks posed by flooding, heatwaves and sea-level rise.

Integrating adaptation and mitigation helps ensure that climate interventions are resilient, cost-effective and equitable, while avoiding unintended consequences and supporting long-term, system-wide change across sectors.



Further information

About the author:

Dr Emma Yule currently works as Project Lead at Verture, and she undertakes consultancy work with organisations working in climate adaptation, research and knowledge exchange. Emma is also co chair of the ECCI Adaptation Community of Practice and the SSN Adaptation sub committee.

For more information on climate adaptation in Scotland, visit <https://adaptation.scot/> where you will find the Adaptation Scotland Capability Framework for public sector organisations, which provides step by step tasks.

Additionally, there are networks and groups you can join to learn more about adaptation and share learnings from your own adaptation work including:

- **[PSCAN](#)**
- **[SSN](#)**
- **[ECCI Adaptation CoP](#)**