

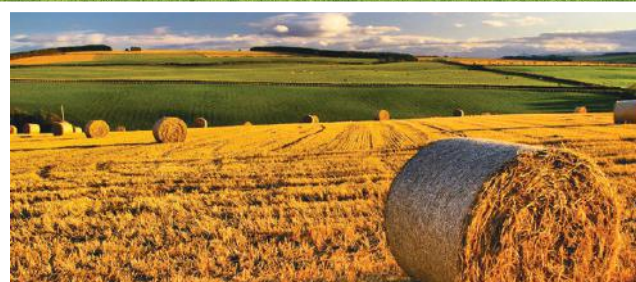


Climate Change in Scotland: Risks, Impacts and Actions



climate  change

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



A guide to the CXC Adaptation Indicators

The CXC Adaptation Indicators project - capturing the 'state of the nation'

CXC has by mid-2016 published over 100 indicators measuring and monitoring progress in building a Climate Ready Scotland.

The indicators support Scottish Government policy in three key areas:

- Inform and analyse risks identified for Scotland in the UK's Climate Change Risk Assessment (CCRA)
- Show progress towards the objectives set out in Scotland's Climate Change Adaptation Programme (SCCAP)
- Inform the independent assessment of the SCCAP carried out by the Adaptation Sub-Committee of the UK Committee on Climate Change

RISK/OPPORTUNITY and **IMPACT** indicators explore risks and opportunities Scotland faces as a result of current climate change (identified from the CCRA/SCCAP), and quantify the impacts across sectors and the regions of Scotland.

ACTION indicators look at what is being done. Are current policy and climate change adaptation actions having the desired effect?

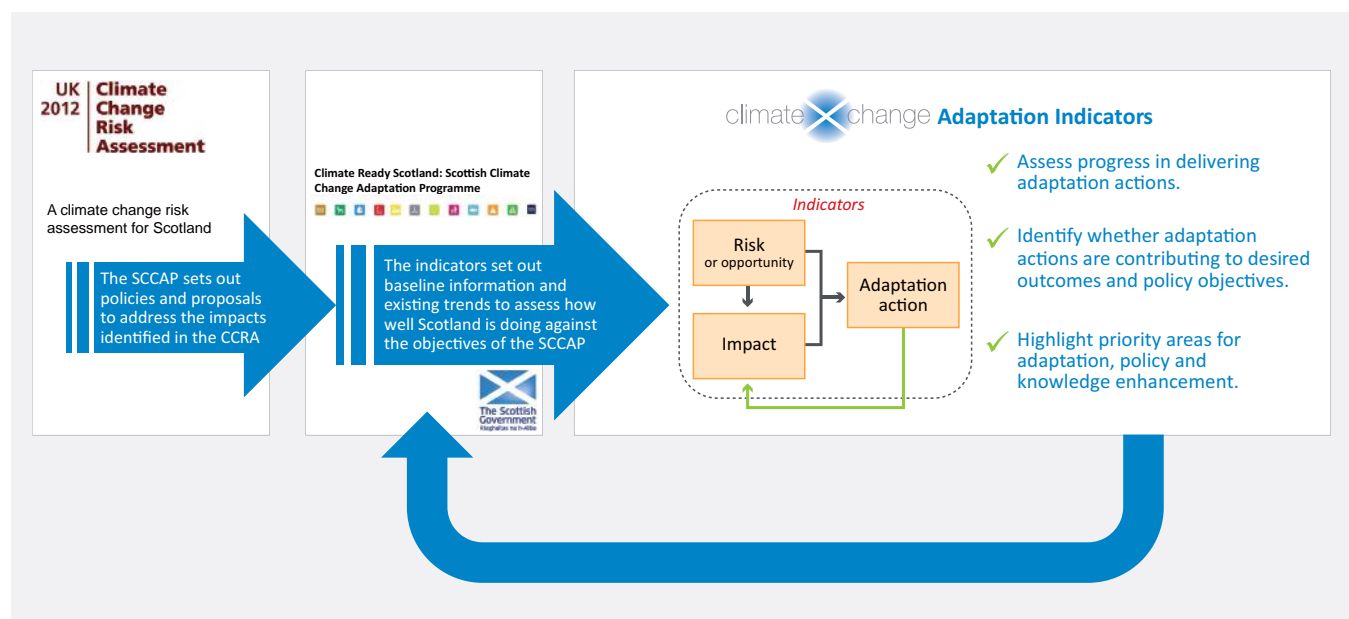
The indicators are multidisciplinary and cross-sectoral. As such they are relevant to the work of a wide range of government policy teams, agencies, NGOs, local authorities, planners and others working towards a climate resilient Scotland. The individual indicators are presented in thematic narratives - a 'one-stop-shop' providing data, insight and analysis on adaptation to climate change.

This first set of 105 indicators, presented in 13 narratives:

- capture the best available scientific knowledge - populated through research by 80 academic researchers and agency staff across 25 organisations; and
- were developed in partnership and consultation with more than 50 policymakers and stakeholders.

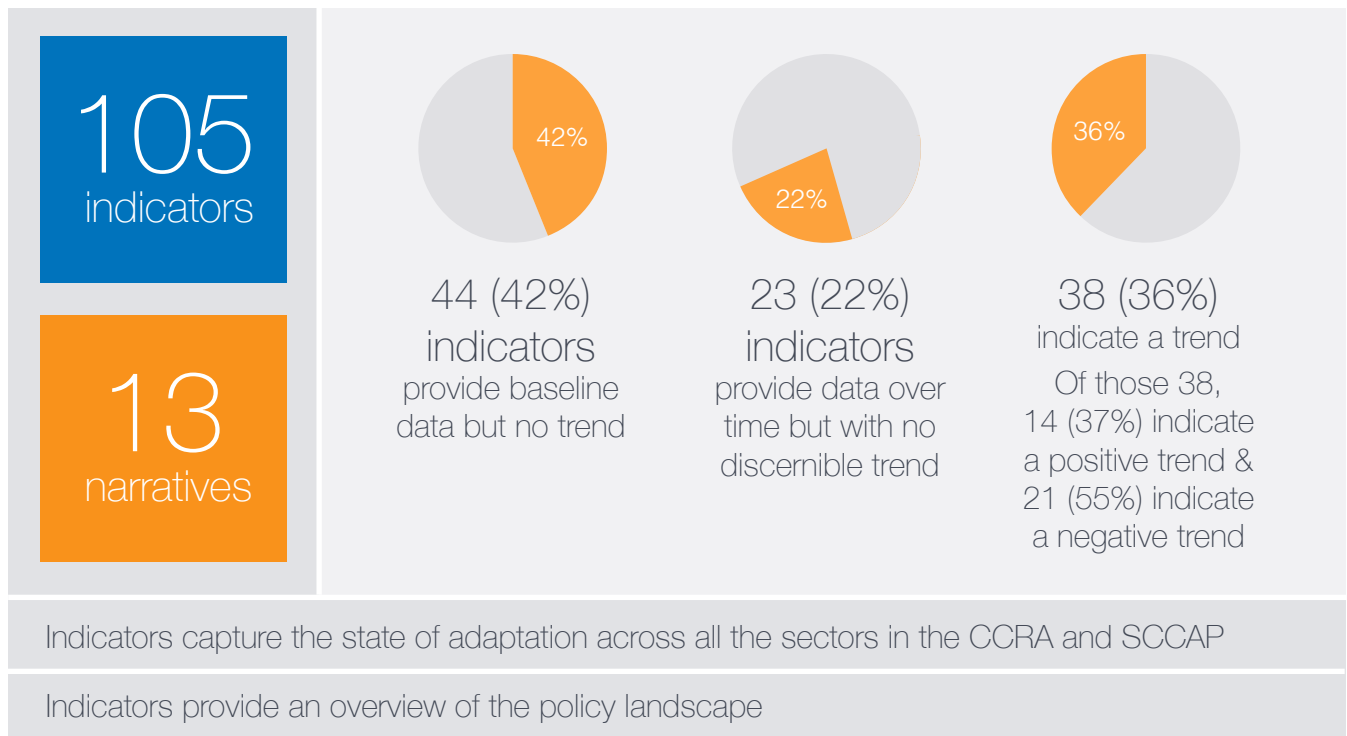
Approach

The indicators were built around policy need. They directly address the risks identified in the CCRA and the objectives of the SCCAP.



Overview of findings

To understand and manage the complex and multi-faceted issue of adapting to climate change, we need to know and quantify the risks and realised impacts, and identify the outcomes of our actions.



For many of the risks/opportunities, impacts and actions the indicators create a first definitive baseline against which to measure future trends but with no trend identifiable yet. However, from the trend data that is available we can for example see that:

- Some risks are growing:
 - Increase in disease risk to Caledonian pinewood (NB36)
 - Increase in average sea surface temperature (NM1)
- But resilience is improving in some sectors:
 - Decrease in buildings in disrepair (BB16)
 - Decrease in population vulnerable to water supply deficit (BW7)
- And changing conditions can also provide opportunities:
 - Increase in the area of prime agricultural land (NA2)
- Climate change is already having an impact in Scotland:
 - Decrease in abundance and productivity of breeding sea birds (NB6a)
 - Increase in prevalence of liver fluke in cattle and sheep (NA26)
 - Climate sensitive species – decrease of Arctic charr in freshwater lochs (NB31b)
 - Increase in warm water fish species exploited by Scottish fishermen (NM21)
- In some areas adaptation actions are already having a positive effect:
 - Decrease in water leakage and losses (BW6)
 - Increased energy performance of Scottish housing stock (BB20)
 - Increase in peatland restoration area (NB22a)
 - Increase in uses and users of the ForestGALES decision support tool (NF21)

Natural Environment

| | Indicator ID and Name | Type | Trend | Policy context | | Narratives | | |
|--------------------|--|--|---|--------------------|--------------------------|---|--|---|
| | | | | SCCAP Objective(s) | CCRA Risks/opportunities | | | |
| Biodiversity | NB3 | Extent and condition of natural landscape connections: hedgerows and ponds | Risk | 🔴 | N2, N3 | Cross-cutting, BD5, AG26/27 | Tracking suitable space in a changing climate | |
| | NB4 | Proportion of ancient woodlands with declining overall suitability for lichen epiphytes | Risk | 🔴 | N2 | BD5, FO5 | Tracking suitable space in a changing climate | |
| | NB6a/ NB17a | Abundance and productivity of breeding sea birds | Impact | 🔴 | N2 | BD9 | Tracking suitable space in a changing climate, Marine and coastal change | |
| | NB6b/ NB17b | Abundance of wintering water birds | Impact | 🟡 | N2 | BD9 | Tracking suitable space in a changing climate | |
| | NB7 | Area of land under landscape scale conservation | Action | 🟡 | N2 | Cross-cutting | Tracking suitable space in a changing climate | |
| | NB10a | Extent of key semi-natural habitats: terrestrial | Risk | 🔴 | N2 | Cross-cutting | Resilience of the natural environment (terrestrial) | |
| | NB10b | Extent of key semi-natural habitats: coastal habitats | Risk | 🔴 | N2 | Cross-cutting | Resilience of the natural environment (terrestrial) | |
| | NB11 | Extent of key habitats: deep peat | Risk | 🔴 | N2 | Cross-cutting | Resilience of the natural environment (terrestrial) | |
| | NB12 | Condition of key habitats: Proportion of notified habitats in unfavourable condition | Risk | 🟡 | N2 | Cross-cutting | Resilience of the natural environment (terrestrial) | |
| | NB13 | Condition of key habitats: Area of modified deep peat soils | Risk | 🔴 | N2 | BD1, BD8, BD13, BD21 | Resilience of the natural environment (terrestrial) | |
| | NB14 | Natural Capital Asset Index | Impact | 🟡 | N2 | Cross-cutting | Resilience of the natural environment (terrestrial) | |
| | NB16a | Abundance and frequency of specialist and generalist species: snow-bed species | Impact | 🟡 | N2 | BD11 | Tracking suitable space in a changing climate | |
| | NB16b | Abundance and frequency of specialist and generalist species: butterflies | Impact | 🟡 | N2 | BD11 | Tracking suitable space in a changing climate | |
| | NB18 | Annual greenhouse gas (GHG) emissions from degraded peatlands | Impact | 🔴 | N2 | BD1, BD8, | Resilience of the natural environment (terrestrial) | |
| | NB19 | Proportion of notified habitats and species in 'positive' condition | Action | 🟡 | N2 | Cross-cutting | Resilience of the natural environment (terrestrial) | |
| | NB22a | Peatland restoration area | Action | 🟡 | N2 | BD1, BD2, BD8, BD13 | Resilience of the natural environment (terrestrial) | |
| | NB23 | Amount of natural regeneration in native woodlands | Action | 🟡 | N2 | FO5 | Resilience of the natural environment (terrestrial), Pests, diseases and invasive species (forestry) | |
| | NB24 | Proportion of water bodies not meeting Good Overall Status | Risk | 🔴 | N2 | BD13, BD14, BD15 | Water quality and availability, Marine and coastal change | |
| | NB27 | Summer low flow events in Scottish rivers (Normalised Flow Index) | Risk | 🔴 | N2 | BD14, BD15, WA2 | Water quality and availability, Extreme weather and infrastructure, Resilience and resource use | |
| | NB31b | Condition and distribution of climate sensitive species: Abundance of Arctic charr in freshwater lochs | Impact | 🔴 | N2 | BD5, BD10, BD13 | Water quality and availability | |
| | NB32 | Freshwater monitoring stations: temperature | Action | 🟡 | N1 | BD13, BD14, BD15, WA2 | Water quality and availability | |
| | NB33 | Progress towards the environmental objectives of the River Basin Management Plans | Action | 🟡 | N2 | BD13, BD14, BD15 | Water quality and availability | |
| | NB36 | Proportion and area of Caledonian pine woodland exposed to Dothistroma needle blight (DNB) | Risk | 🔴 | N2 | BD4, BD46, FO5 | Pests, diseases and invasive species (forestry) | |
| | NB37 | Proportion of native woodland affected by invasive non-native plant species | Impact | 🔴 | N2 | BD3, FO5 | Pests, diseases and invasive species (forestry) | |
| | NB39 | Freshwater habitats with reported presence of key invasive non-native species (INNS) | Impact | 🔴 | N2 | BD3, BD13 | Water quality and availability | |
| | NB42/ NF17/18 | Number and area of reported wildfires in forests and key habitats | Impact | 🔴 | N2 | BD12 | Resilience of the natural environment (terrestrial) | |
| | Agriculture | NA1 | Comparison of land capability against actual land use | Risk | 🔴 | N3 | AG1b, c, d, e, AG2/FL4, AG4, AG10, AG19, AG21, AG25/AG51/AG52, AG66 | Suitability and productivity (agriculture), Sustainable Agriculture |
| | | NA2 | Area of Prime Agricultural Land (Land Capability) | Risk | 🟡 | N3 | AG1b, c, d, e, AG2/FL4, AG4, AG10, AG19, AG21, AG25/AG51/AG52, AG66 | Suitability and productivity (agriculture), Sustainable Agriculture |
| | | NA3a/b | Crop yields (including agronomic inputs and variability) | Impact | 🟡 | N3 | AG1b, c, d, e, AG66 | Suitability and productivity (agriculture) |
| | | NA5 | Trends in breeding farmland birds | Impact | 🟡 | N3 | AG26/27 | Sustainable Agriculture |
| | | NA6 | National agricultural crop portfolio and diversity index | Action | 🟡 | N3 | AG1b, c, d, e, AG4, AG10, AG25/AG51, AG52, AG66 | Suitability and productivity (agriculture) |
| | | NA8 | Sustainable intensification index (Scottish LFA beef sector) | Action | 🟡 | N3 | BD21 | Sustainable Agriculture |
| | | NA9 | Proportion of farmland (Utilised Agricultural Area) under High Nature Value (HNV) farming systems | Action | 🟡 | N3 | BD21 | Sustainable Agriculture |
| | | NA10 | Soil erosion risk | Risk | 🔴 | N3 | AG19 | Condition of agricultural soils |
| | | NA11 | Soil carbon concentration in arable soils | Impact | 🔴 | N3 | AG19 | Condition of agricultural soils |
| | | NA12 | Agricultural production methods which reduce erosion risk (Proportion of arable land using reduced/zero tillage; soil cover) | Action | 🟡 | N3 | AG19, BD13 | Condition of agricultural soils |
| | | NA13 | Abstraction of water for irrigation | Impact | 🔴 | N3 | AG4, WA1, WA2, WA5 | Suitability and productivity (agriculture), Water quality and availability, Resilience and resource use |
| | | NA14 | Freshwater bodies affected by diffuse pollution due to agriculture | Impact | 🟡 | N3 | AG19, BD13 | Condition of agricultural soils, Water quality and availability |
| NA17 | | Area of agricultural land at significant flood risk (rivers and sea) | Risk | 🔴 | N3 | AG2/FL4 | Water quality and availability | |
| NA21 | | Risk of liver fluke (Fasciola hepatica) in cattle and sheep | Risk | 🔴 | N3 | AG44 | Suitability and productivity (agriculture) | |
| NA22 | | Area of cultivation under glass or plastic structures | Risk | 🔴 | N3 | AG3 | Suitability and productivity (agriculture) | |
| NA25 | | Range and prevalence of climate marker pests and diseases in crops: Number of potato blight outbreaks | Impact | 🟡 | N3 | AG3 | Suitability and productivity (agriculture) | |
| NA26 | | Prevalence of liver fluke (Fasciola hepatica) in cattle and sheep | Impact | 🔴 | N3 | AG44 | Suitability and productivity (agriculture) | |
| NA28 | | Wetness risk for agriculture (arable suitability and grassland suitability) | Risk | 🟡 | N3 | AG21, AG25/AG51/AG52 | Condition of agricultural soils, Suitability and productivity (agriculture), Water quality and availability | |
| NA29 | | Drought risk to agricultural land | Risk | 🟡 | N3 | AG4, AG25/AG51/AG52 | Condition of agricultural soils, Suitability and productivity (agriculture), Water quality and availability, Resilience and resource use | |
| Forestry | | NF1 | Proportion of major timber species on Scotland's National Forest Estate planted in areas likely to be climatically suitable in 2050 (Sitka spruce and Scots pine) | Risk | 🔴 | N3 | FO4b, FO2 | Suitability and productivity (forestry) |
| | NF3 | Proportion of total woodland under High Nature Value (HNV) Forestry | Action | 🟡 | N3 | BD21, FO5 | Suitability and productivity (forestry) | |
| | NF4 | Diversity of tree species ordered for planting in Scotland | Action | 🟡 | N2, N3 | Cross-cutting, BD4 | Pests, diseases and invasive species (forestry), Suitability and productivity (forestry) | |
| | NF5 | Planted forest tree species diversity index | Action | 🟡 | N2, N3 | Cross-cutting, BD4 | Pests, diseases and invasive species (forestry), Suitability and productivity (forestry) | |
| | NF6 | Number of uses & users of the Ecological Site Classification (ESC) decision support tool (DSS) | Action | 🟡 | N3 | Cross-cutting, BD4 | Suitability and productivity (forestry) | |
| | NF7 | Proportion and area of pine woodland exposed to Dothistroma needle blight (DNB) | Risk | 🔴 | N3 | FO1a | Pests, diseases and invasive species (forestry) | |
| | NF8 | Proportion and area of larch within Phytophthora ramorum Risk Zone 1 | Risk | 🔴 | N3 | FO1 | Pests, diseases and invasive species (forestry) | |
| | NF9 | Forest area and proportion of stands infected by Dothistroma needle blight | Impact | 🔴 | N3 | FO1a | Pests, diseases and invasive species (forestry) | |
| | NF10 | Forest area infected by Phytophthora ramorum (Pr) | Impact | 🔴 | N3 | FO1 | Pests, diseases and invasive species (forestry) | |
| | NF11/ NF12 | Number of forest sites served with a Statutory Plant Health Notice (SPHN) for Phytophthora ramorum (Pr)/Area of forest felled under Special Plant Health Notices (SPHNs) for Phytophthora ramorum (Pr) | Action | 🟡 | N3 | FO1 | Pests, diseases and invasive species (forestry) | |
| | NF14 | Area of woodland with active, approved deer management plans | Action | 🟡 | N3 | Cross-cutting | Pests, diseases and invasive species (forestry), Suitability and productivity (forestry) | |
| | NF16 | Proportion of coniferous woodland on the National Forest Estate with a high/medium risk of wind throw | Risk | 🔴 | N3 | FO3 | Suitability and productivity (forestry) | |
| NF21 | Number of uses and users of the ForestGALES decision support tool | Action | 🟡 | N3 | FO3 | Suitability and productivity (forestry) | | |
| Marine and coastal | NM1 | Changes in average sea surface temperature (SST) | Risk | 🔴 | N2 | MA1; MA4a; MA4b; MA6; MA23; MA30; MAr1 | Marine and coastal change | |
| | NM7 | Number of Harmful Algal Blooms (HAB) | Impact | 🔴 | N3 | MA1; MA30 | Marine and coastal change | |
| | NM9b | Damage to cultured aquatic species: Frequency of escapes from fish farms due to weather | Impact | 🔴 | N3 | MA30 | Marine and coastal change | |
| | NM21 | Occurrence of warm water species in fish stocks exploited by Scottish fisherman: European anchovy; Squid; (red mullet; John Dory; European sea bass) | Impact | 🟡 | N3 | MAr1 | Marine and coastal change | |
| NM46 | Change in the latitudinal distribution of industry sectors in response to shifting optimal conditions for species specific growth; aquaculture | Action | 🔴 | N3 | MAr1 | Marine and coastal change | | |

Buildings & Infrastructure Networks


| | Indicator ID and Name | Type | Trend | Policy context | | Narratives | | |
|--------------------------|---------------------------------|--|---|--------------------|--------------------------|-----------------------------------|---|--|
| | | | | SCCAP Objective(s) | CCRA Risks/opportunities | | | |
| Built Environment | BB1/BB3 | Property at risk of flooding (residential; non-residential) | Risk | 🔴 | B2, S1,S2,S3 | BE10/BE11/BE12/BE15/BE18/FL6/FL24 | Flooding and infrastructure, Climate change risks to society and our capacity to adapt | |
| | BB6 | Cultural Heritage in Flood Risk Areas | Risk | 🔴 | B1, B2 | BE4/FL15 | Flooding and infrastructure | |
| | BB11 | Planning Decisions that do not reflect SEPA's flood risk advice | Action | 🔴 | B2 | BE10/BE11/BE12/BE15/BE18/FL6/FL24 | Flooding and infrastructure, Resilience and resource use | |
| | BB13 | Proportion of local authority areas under impermeable surfaces / Change in impermeable surfacing in built-up areas | Action | 🔴 | B2, B3 | BE10/BE11/BE12/BE15/BE18/FL6/FL24 | Flooding and infrastructure | |
| | BB16 | Building Condition and Disrepair | Risk | 🟢 | B1, B3 | BE13/BE31 | Flooding and infrastructure, Resilience and resource use | |
| | BB17/BB18 | Dampness; condensation in housing stock | Impact | 🟡 | B1, B3 | BE13/BE31 | Extreme weather and infrastructure | |
| | BB20 | Energy Performance of Scottish Housing Stock | Action | 🟢 | B1, B2 | BE9 | Resilience and resource use | |
| | BB26 | Natural gas usage; domestic | Action | 🟢 | B1, B2 | BE9 | Resilience and resource use | |
| | BB27 | Natural gas usage; non-domestic | Action | 🟢 | B1, B2 | BE9 | Resilience and resource use | |
| | BE1/BE2/BE3 | Major power stations in areas at flood risk | Risk / Action | 🔴 | B1, B2, B3 | FL11a/ENr2 | Flooding and infrastructure | |
| Energy Infrastructure | BE4/14 | Electricity supply disruption due to flooding | Impact | 🔴 | B1, B2, B3 | FL11a/ENr2/EN1 | Flooding and infrastructure, Resilience and resource use, Climate change risks to society and our capacity to adapt | |
| | BE5 | Electricity substations located in areas at flood risk | Risk | 🔴 | B1, B2, B3 | FL11b | Flooding and infrastructure, Climate change risks to society and our capacity to adapt | |
| | BE6 | Customers reliant on electricity substations in areas at flood risk | Risk | 🔴 | B1, B2, B3 | FL11b | Flooding and infrastructure, Resilience and resource use, Climate change risks to society and our capacity to adapt | |
| | BE7 | Substations in areas at flood risk with completed Flood Risk Assessments | Action | 🔴 | B1, B2, B3 | FL11b | Flooding and infrastructure, Resilience and resource use | |
| | BE8 | Substations in areas at flood risk with completed or planned flood protection works | Action | 🔴 | B1, B2, B3 | FL11b | Flooding and infrastructure, Resilience and resource use | |
| | BE15 | Electricity supply disruption caused by severe weather events | Impact | 🟡 | B1, B2, B3 | severe weather events | Extreme weather and infrastructure | |
| | BT2 | Road Network at risk of flooding | Risk | 🔴 | B1, B2, B3 | FL8a/TR1 | Flooding and infrastructure | |
| | BT4 | Flood events affecting the trunk road network | Impact | 🔴 | B1, B2, B3 | FL8a/TR1 | Flooding and infrastructure, Extreme weather and infrastructure, Resilience and resource use, Climate change risks to society and our capacity to adapt | |
| Transport Infrastructure | BT6 | Trunk road network benefitting from fluvial flood protection | Action | 🔴 | B1, B2, B3 | FL8a/TR1 | Flooding and infrastructure, Resilience and resource use | |
| | BT8 | Railway network at risk of flooding | Risk | 🔴 | B1, B2, B3 | FL8b | Flooding and infrastructure | |
| | BT9 | Disruption risk to railway services as a result of flooding | Risk | 🔴 | B1, B2, B3 | FL8b | Flooding and infrastructure, Resilience and resource use, Climate change risks to society and our capacity to adapt | |
| | BT12 | Flood events affecting the railway network | Impact | 🔴 | B1, B2, B3 | FL8b | Flooding and infrastructure, Resilience and resource use, Climate change risks to society and our capacity to adapt | |
| | BT16 | Rail network benefitting from fluvial flood protection | Action | 🔴 | B1, B2, B3 | FL8b | Flooding and infrastructure, Resilience and resource use | |
| | BT17 | Risk of traffic disruption as a result of flooding | Risk | 🔴 | B1, B2, B3 | FL8a/TR1 | Flooding and infrastructure, Resilience and resource use | |
| | BT22/ BT23 | Landslide events affecting the road network; Road closures due to landslides | Impact | 🔴 | B1, B2, B3 | TR2 | Extreme weather and infrastructure | |
| | BT26 | Road and rail bridges vulnerable to scour | Risk | 🔴 | B1, B2, B3 | TR6 | Extreme weather and infrastructure | |
| | Water/wastewater infrastructure | BW4 | Wastewater treatment works in areas at flood risk | Risk | 🔴 | B2 | FL7/FL24/FL27 | Flooding and infrastructure, Climate change risks to society and our capacity to adapt |
| | | BW5 | Water treatment works in areas at flood risk | Risk | 🔴 | B2 | FL7/FL24/FL27 | Flooding and infrastructure, Climate change risks to society and our capacity to adapt |
| BW6 | | Water leakage and losses | Action | 🟢 | B2, N2 | BD15, WA5 | Extreme weather and infrastructure, Resilience and resource use | |
| BW7 | | Customers and zones vulnerable to supply deficit | Risk | 🟢 | B2, N2 | BD15, WA5 | Extreme weather and infrastructure, Resilience and resource use | |
| BW8 | | Domestic water usage | Risk / Action | 🟡 | B2, N2 | BD15, WA5, WA4 | Extreme weather and infrastructure, Resilience and resource use | |
| BW9 | | Non-domestic water usage | Risk / Action | 🟢 | B2, N2 | BD15, WA5 | Extreme weather and infrastructure, Resilience and resource use | |

Society


| | Indicator ID and Name | Type | Trend | Policy context | | Narratives | |
|---------|-----------------------|--|--------|--------------------|--------------------------|---|---|
| | | | | SCCAP Objective(s) | CCRA Risks/opportunities | | |
| Society | CRS8 | Excess deaths due to extreme temperatures | Impact | 🟢 | S1, S2 | HE1, HE5 | Climate change risks to society and our capacity to adapt |
| | CRS9 | Number of hospital admissions as a result of extreme weather events | Impact | 🟡 | S1, S2 | HE2, HE6, HE7 | Climate change risks to society and our capacity to adapt |
| | CRS12 | Number of community services at significant risk of flooding | Risk | 🔴 | S2, S3, B2 | FL1/2, FL7/FL24/FL27 | Climate change risks to society and our capacity to adapt, Flooding and infrastructure |
| | CRS20 | Number of flood incidents attended by SFRS each year | Impact | 🟡 | S1, S2, S3, B2 | FL1, FL7/FL24/FL27, GMr1, BE10/BE11/BE12/BE15/BE18/FL6/FL24 | Climate change risks to society and our capacity to adapt, Flooding and infrastructure, Resilience and resource use |
| | CRS34 | Number of registrations for flood warnings/alerts | Action | 🟢 | S2, S3 | FL1, FL2 | Climate change risks to society and our capacity to adapt, Flooding and infrastructure, Resilience and resource use |
| | CRS54 | Off-grid private water supplies at risk of flooding | Risk | 🔴 | S1, S2, S3 | FL1, FL2, HE16/MA2b | Climate change risks to society and our capacity to adapt, Extreme weather and infrastructure |
| | CRS58 | Number of households/people falling below the SHQS & Tolerable Standard | Risk | 🟢 | S2, S3, B3 | ENr1, BE31, HE19 | Climate change risks to society and our capacity to adapt, Extreme weather and infrastructure |
| | CRS61 | Number of households in fuel poverty | Risk | 🔴 | S2, B3 | ENr1 | Climate change risks to society and our capacity to adapt |
| | CRS62 | Domestic debt held with energy companies for the supply of electricity and gas | Risk | 🟢 | S2, B3 | ENr1 | Climate change risks to society and our capacity to adapt |
| | CRS64 | Uptake of energy efficiency measures | Action | 🔴 | S2, B3 | ENr1 | Climate change risks to society and our capacity to adapt, Resilience and resource use |

Key


Understanding the indicator icons




Upward trend



Downward trend




No significant trend




No trend possible


The colour of icon indicates whether the trend is positive (desirable), negative (undesirable) or neutral (neither desirable or undesirable) as follows:



Positive



Negative

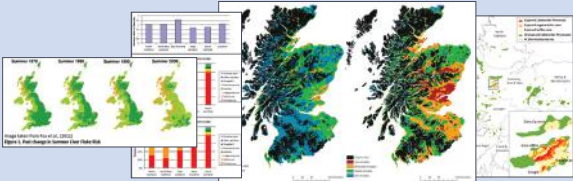


Neutral

Trends are described as 'positive' or 'negative' depending on whether the development is desirable for society. Based on what is being measured, both an increasing and a decreasing trend could therefore be positive.

Navigating the indicators

The table [pages 4 & 5] provides a complete at-a-glance list of all 105 indicators, listed by SCCAP theme (Natural Environment; Buildings and Infrastructure Networks; Society) and by sub-theme to help navigate the array of information. The SCCAP policy objectives and the CCRA risks/opportunities that each indicator addresses are presented together with the narratives that set the individual indicators in context.



Narratives bring interlinked indicators together to explore key adaptation questions

What is happening? What are the adaptation options?
What are the policy levers?

An overarching storyline links related Risk, Impact and Action indicators in the context of the adaptation issue and policy landscape

The CXC Indicators are the go-to documents for the complete in-depth story for a particular climate risk/opportunity, impact or action in Scotland, providing:


- rich depth of data and contextual information;
- at-a-glance baseline and trend data and key messages;
- summary of past and present situation, and future projections;
- interpretation of trends and patterns of change;
- policy context; and
- data sources and handy links for further information.

All the indicators are available on the CXC website – you can find them using either the indicator table: www.climateexchange.org.uk/files/1214/7449/3602/CXC_adaptation_indicator_full_list.pdf or via the Narratives: www.climateexchange.org.uk/adapting-to-climate-change/indicators-and-trends/

Example 1: Related indicators: The risk of tree pests and diseases, *Phytophthora ramorum* (*Pr*)


RISK

41% of larch in the National Forest Estate lies within *Pr* Risk Zone 1 (NF8)




ACTION

236 Statutory Plant Health Notices for *Pr* were issued during 2010 – 2015 (NF11)




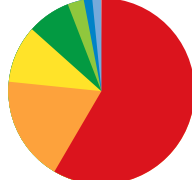
IMPACT

Pr is concentrated in Dumfries & Galloway where up to 6000ha of larch is infected (NF10)



No change in diversity of conifers ordered for planting; small increase in novel species (NF4)





Small increase in diversity of planted forest tree species over last 20 years (NF5)

Indicators:

NF8: Proportion and area of larch within *Pr* Risk Zone 1

NF10: Forest area infected by *Pr*

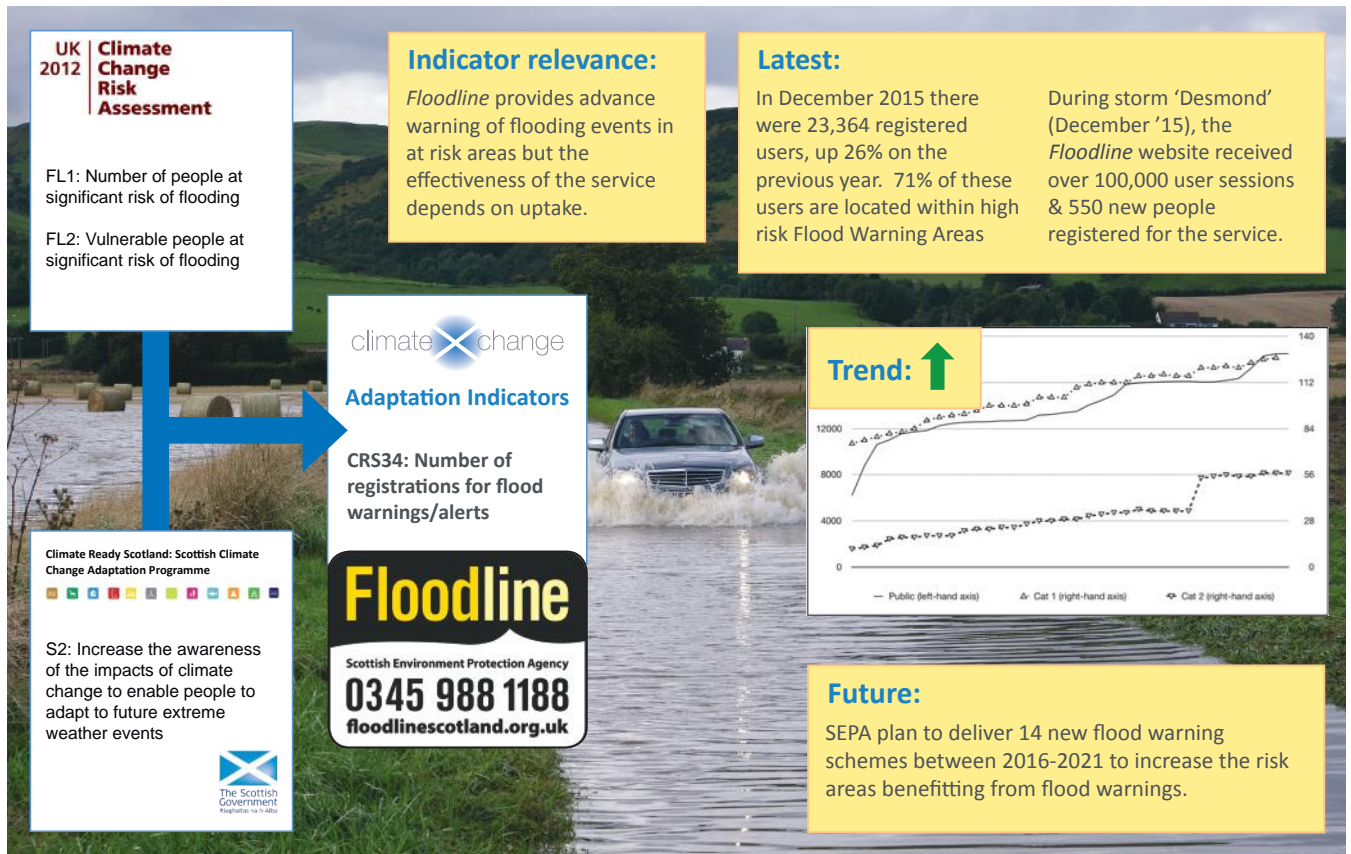
NF11: Number of forest sites served with a Statutory Plant Health Notice (SPHN) for *Pr*

NF4: Diversity of tree species ordered for planting in Scotland

NF5: Planted forest tree species diversity index

Phytophthora ramorum (*Pr*) is a significant **RISK** for Scotland's commercially important larch forests. *Pr* has spread rapidly in recent years. As it thrives in mild and wet conditions; projected climate change could increase the **IMPACT** resulting from more widespread infection. The indicators monitor key management **ACTIONS** and strategies which either target specific control measures or increase the general resilience of Scotland's forests.

Example 2: Individual indicator: CRS34 – Number of registrations for flood warnings/alerts



Going forward

Policy makers and practitioners are generally trying to meet multiple economic, social and environmental objectives. Climate change risk and adaptation action plays into many of these, sometimes magnifying existing challenges and other times offering ways of achieving multiple benefits. Our indicators recognise the complexity of decision making and provide a 'way in' to understanding climate change that explicitly links to other policy aims and challenges.

As well as successfully developing indicators, the project is important in identifying critical data gaps, and will continue to play a significant role in informing future cycles of policy development, for example by contributing evidence for the second SCCAP to be published in 2019.

The value of the indicators increases with time, as trends increasingly become apparent and we can attribute success to particular policy drivers.

These trends will show:

- the evolving risks and impacts of our changing climate;
- how well policy is working to address those risks and impacts; and
- where policy can be optimised.

It is vital that we continue to gather evidence to ensure that Scotland's adaptation response is informed, flexible and can achieve the best outcomes for all.



ClimateXChange (CXC) is Scotland's Centre of Expertise on Climate Change, supporting the Scottish Government's policy development on climate change mitigation, adaptation and the transition to a low carbon economy. The centre delivers objective, independent, integrated and authoritative evidence in response to clearly specified policy questions.

