

LCAT User Guide

and technical information

Autumn 2024



LCAT

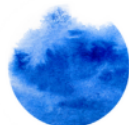
LOCAL CLIMATE
ADAPTATION TOOL



University
of Exeter



CORNWALL
COUNCIL
one and all · onen hag oll



Blue
Adapt



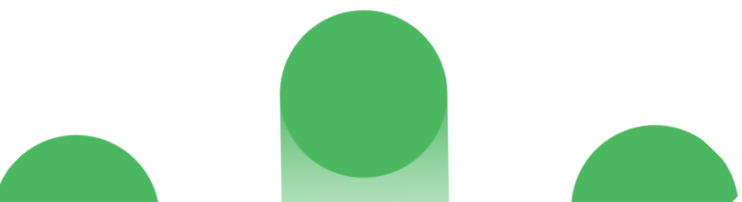
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UK Research
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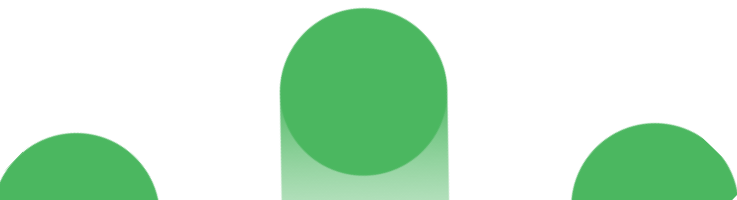
- Who is the tool for?
- What is the step-by-step process?
- How will LCAT support decision-making?
- Why focus on climate adaptation?
- What can I do with the results?
- Common questions
- Technical information



Who is the tool for?

Anyone working with and for their local community.

- ✓ **Local decision-makers.** The tool has been designed with, and is created for, decision-makers at a local level.
- ✓ **Local organisations** such as local authorities, NHS, emergency services or voluntary sector.
- ✓ **Across disciplines & hierarchies.** From housing to health, to transport and more. The tool is for both junior and senior staff. As well as anyone who wants to understand future local climate and its associated health impacts.
- ✓ **Multi-agency, collaborative working** on climate adaptation, providing a single starting point and common language that encourages alignment of approach.



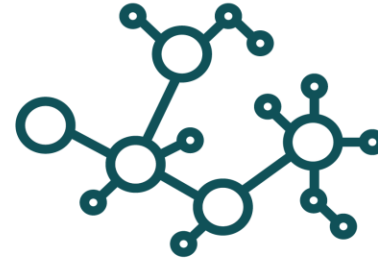
A simple step-by-step process for users



**Select a
geographical
area**



**View the local
climate model**



**Explore the routes
to health impacts
of climate change
and who is most
vulnerable**



**Recommendations
for action**

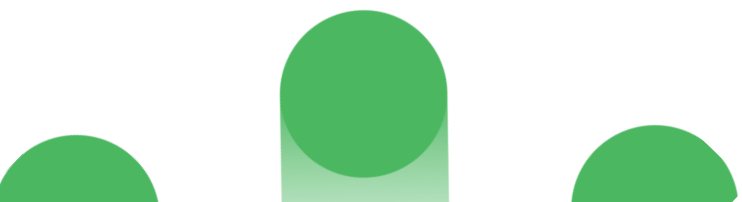


Why focus on climate adaptation?

LCAT offers you data and evidence to understand and plan for the current and future climate. In turn, ensuring communities are resilient for a future climate and risks to health and wellbeing are reduced.

Benefits of adaptation include:

- ✓ Making communities stronger in the face of change
- ✓ Making the places we live more resilient, healthier, safer and greener
- ✓ Strengthening our systems and services & reducing damage
- ✓ Saving money by investing in adapting now



What can I do with the results?



The results will help you to:

✓ Understand your area's future climate



✓ Understand the likely hazards, risks and opportunities to your local area and local communities



✓ Explore what the evidence suggests you could do to reduce risks and maximise opportunities



✓ Understand who is most vulnerable to allow for a targeted and just approach

Common questions



Q: Is the tool hard to use or time consuming?

No. LCAT is easy and quick to use, providing data & evidence within very few clicks.

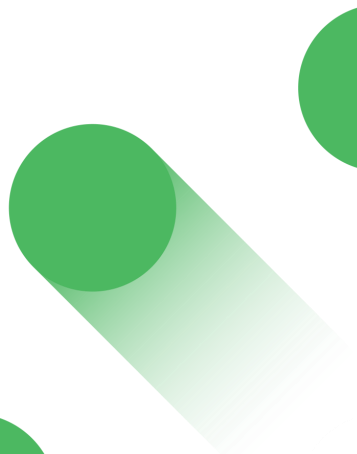
Q: Do I need to input any data or information?

No. Just by clicking on your local area, the tool provides you with everything you need.



Q: The impacts to health and wellbeing are presented in a climate impact pathway, what is this?

The impacts to human health and wellbeing from our changing climate are complex. We have created these pathways to help you to visualise the complex relationships involved and see where multiple disciplines and sectors have a role to play.



Common questions



Q: How important is it to use the tool in partnership with others in my area?

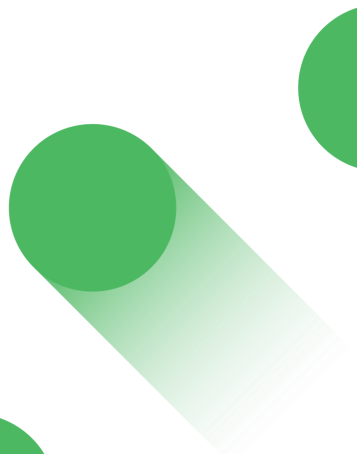


The tool can be used by any individuals, at any time. However, a multi-agency, collaborative approach to climate adaptation is best practice. Maladaptation can be avoided, with benefits to many people, sectors and systems.

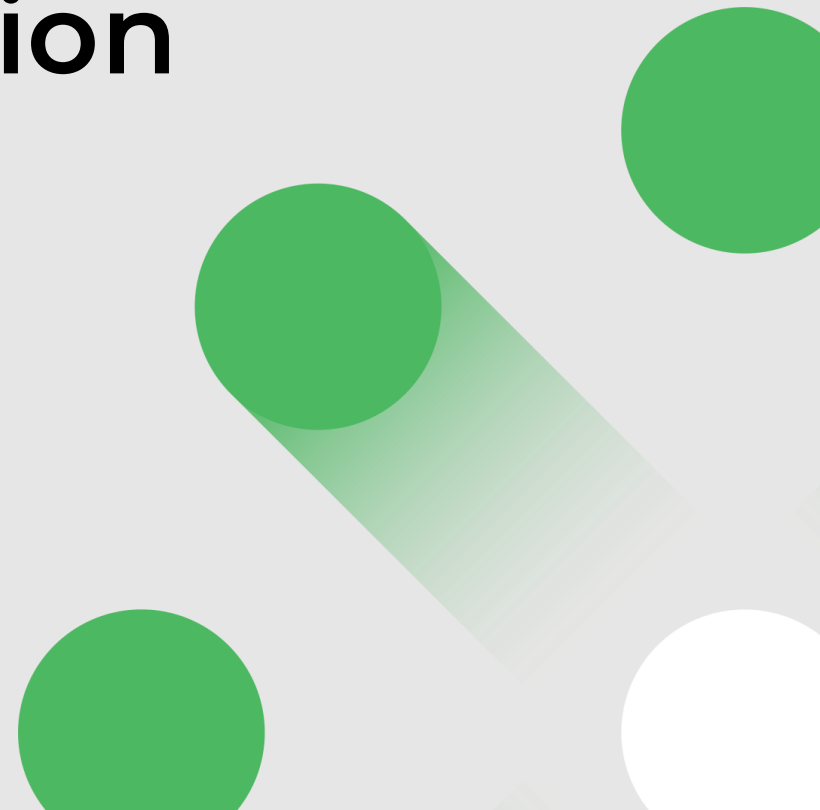


Q: Why does LCAT focus on different sectors?

The health and wellbeing impacts of climate change are complex and wide ranging. They cross-cut multiple sectors from healthcare, to housing, to infrastructure. The tool aims to help professionals from across organisations and sectors play a part in building resilient and healthy communities.



Technical Information



Technical Information

Q: What are GWLs?

Climate change is often referred to in terms of Global Warming Levels (GWLs) which is the difference between future temperatures and those from pre-industrial levels.

The Paris Agreement aims to restrict the increase in global average temperature to less than 2°C above pre-industrial levels (GWL of 2°C), and to pursue a target of limiting the increase to 1.5°C (GWL of 1.5°C). As a result of this agreement, UN member states have defined their own Nationally Determined Contributions (NDCs) to reduce their usage of fossil fuels and thus the emissions of greenhouse gases.



Technical Information

Q: What are RCPs?

Climate models represent complex physical processes that govern our atmosphere and oceans. They are used to predict the Earth's climate in future decades based on different scenarios, known as Representative Concentration Pathways (RCPs).

Different RCPs span a wide range of plausible future scenarios and specify different concentrations of greenhouse gases that will result in different changes to our climate in future decades.

Technically, they result in different levels of radiative forcing which means that Earth receives more incoming energy from sunlight than it radiates to space, leading to warming and other climate impacts.

[More on next page]



Technical Information

Q: What are RCPs? (Continued)

There are four RCPs:

- (i) RCP 2.6 represents a pathway where greenhouse gas emissions are strongly reduced
- (ii) RCP 8.5 is a pathway where greenhouse gas emissions continue to grow unmitigated
- (iii) & (iv) RCP 4.5 and 6.0 are two medium pathways, with varying levels of mitigation.

The United National Environment Programme suggest that RCP6.0 aligns with current existing global policies and is expected to lead to a global warming level of 2.8C in 2100.

LCAT presents results for RCP6.0 and RCP8.5, which is often referred to as a 'worst-case scenario'.



Technical Information

Why are clouds important?

Clouds play an important role in our climate as they can shade the Earth and trap heat.

Which one of these happens in practice will depend on how high they are, the type of cloud, how reflective they are, and whether it is day or night.

Cloudiness or cloud cover refers to the extent to which the atmosphere is covered by cloud and is estimated in fractions or percent, i.e. 'overcast' might refer to near 100% cloudiness while 'clear' might be something closer to 0% cloudiness.

How clouds themselves will respond to increased temperatures and other factors associated with climate change will result in feedback that needs to be considered within climate predictions.

Modelling clouds, and potential feedback, is very complex as clouds occur on much smaller scales than other factors used in models to predict the climate and requires extremely fine-scale physics.



Technical Information

What climate data sources are you using?

The current iteration of the tool uses climate data from CHES-SCAPE. CHES-SCAPE provides bias-corrected data for England, Scotland, Wales, and the Isle of Man.

The CHES-SCAPE data is based on UKCP18 and extends it by the following:

- Downscaling to 1 km resolution
- Bias-corrected data using CHES-met observation data
- Developing alternative RCP scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5)



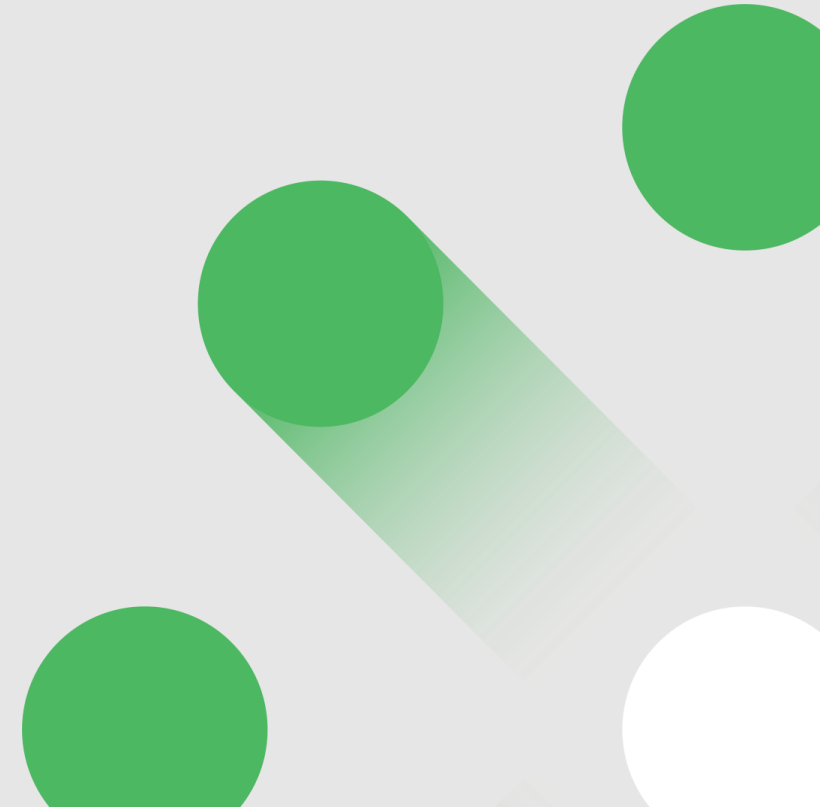
Technical Information

How are the Northern Ireland and Isles of Scilly climate data different?

The CHES-SCAPE dataset provides non bias-corrected data for Northern Ireland and the Isles of Scilly. This is the climate data displayed in the tool. This climate data is downscaled to 1 km resolution, but is not bias-corrected against historical data. For more information about bias correction please read the next slide.

Shetland Islands Disclaimer

Climate predictions for the Shetland Islands (bias and non bias-corrected) are not included in the CHES-SCAPE dataset. Please be aware that climate predictions displayed in LCAT for these regions are approximated to the closest predictions available in the Orkney Islands.



Technical Information

What is bias correction?

Climate model data contains systematic errors, also known as biases. These biases occur for various reasons like limited spatial resolution or simplification of the global climate system and the input variables used. Biases reflect that climate models are producing predicted data and do not represent observed data.

Bias correction is done to the model outputs to provide more accurate data and future observations. Many methods can be used to carry out bias correction and they require good observational/historical datasets.

Bias correction does not eliminate all errors in the climate models, and this should be considered when implementing the climate model outputs.

If you would like to read more about bias correction, please see the UKCP18 Guidance [here](#)



Technical Information

Is there a methodology to the impact pathway maps?

Yes.

We have created systems diagrams using the mDPSEEA conceptual framework (Morris et al., 2006).

The impact pathway maps are a way to visually represent a complex system, and the relationships between different factors or variables within that system.

mDPSEEA is an analytical framework used to understand the interactions between human activities, the environment, and human health impacts. By examining each of its 6 components, mDPSEEA helps to assess and understand the dynamics between human actions and their environmental consequences.



Technical Information

What does mDPSEEA stand for?

The abbreviation mDPSEEA stands for each of its 6 components:

- Modified Drivers
- Pressures
- States
- Exposures
- Effects
- Actions

The 'modification' to the DPSEEA framework created by the WHO, is the addition of social, economic, demographic, and behavioural contexts.

How have you drawn the pathways?

Our team used Kumu. Kumu is a free online platform where you can build system diagrams and personalise them in a variety of ways.



Technical Information

How do I navigate the pathways in the tool?

The climate impact pathways are separated into six climate topics. You can see two views of each pathway.

- The **summary view** automatically loads and displays a condensed version of the pathway
- The **complete view** may be selected from the dropdown and displays the full version of the pathway

The pathways are interactive.

- Click on an **element** to see a description and the related reference IDs
- Click on the **line between** two elements to see the references that support the connection
 - The connections are labelled as either same or opposite
 - A **same** relationship means that both elements increase or decrease together
 - An **opposite** relationship means that when one element increases the other decreases and vice versa
- Clicking and holding an element activates **'focus' mode** allowing individual pathways to be viewed. Using the up arrow below the zoom buttons expands the focus while the down arrow contracts it.
- The pathways are searchable. Entering key word(s) into the search bar will scan the element titles, the tags in each element, and the descriptions for all relevant results.

Want to learn more about adaptation?

Our Introduction to Climate Change Adaptation supports learning.

It explains why adaptation is important & how to do it well.

Only takes 1hr to read it!

You can access it [here](#)

