LCAT
LOCAL CLIMATE ADAPTATION TOOL

Frequently Asked Questions

ABOUT

What is LCAT?

The Local Climate Adaptation Tool is a free, open source web-tool that is being developed to support local decision-makers find evidence-based adaptations to climate change. It provides information on:

- the local future climate
- the impact of changes in climate on human health, across different sectors. As of November 2022, this focusses just on the impact of changes in temperature
- evidence-based adaptation recommendations to help reduce risks or maximise opportunities
- who is vulnerable in the local area

The current iteration is a prototype and so is incomplete. For the impact maps, the methodology is also being tested and currently focuses on temperature. We aim to launch later in 2023.

Who is developing the tool?

The project is a partnership between the European Centre for Environment and Human Health (University of Exeter), Cornwall Council, Then Try This and The Alan Turing Institute.

Co-design is fundamental to the development of LCAT. Local decision-makers from across the UK are collaborating with the project to inform, test and design at every stage.

Decision-makers involved have come from local authorities, NHS bodies, emergency services and the charity and private sector.

Who is the tool for?

The tool has been designed with, and is created for, decision-makers at a local level. These might be professionals working for a local authority, NHS body or within the voluntary or private sector. The tool is designed to be used by professionals across sectors from housing to health, to transport, as well as anyone who wants to understand future local climate and its associated health impacts.

Importantly, the tool aims to support and encourage multi-agency, collaborative working on climate adaptation, providing a single starting point and common language that encourages alignment of approach.

Why was LCAT produced?

LCAT is being produced in response to feedback from stakeholders – decision-makers working across sectors.

This included a need for:

- local future climate models
- data and evidence on the likely impact to their local communities
- clear guidance on appropriate adaptation actions, that are evidence-based
- data and evidence that supports them to understand who is most vulnerable

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.

Health inequality, and equality more broadly, are key concerns for our stakeholders. Those vulnerable to climate change impacts are often vulnerable due to multiple factors and not just those impacting personal health. For example, quality of housing, access to greenspace and poverty. It is therefore important that professionals across sectors and departments work together to understand and reduce those inequalities.

Everyone has a part to play in reducing the risk to future health and, in turn, reducing health inequalities.

Why is the tool only looking at heat?

The tool is being developed in stages. As it is developed further, we will publish updated iterations, with more data, content and evidence. The current version (as of November 2022) is a prototype. Using the UK's Third Climate Change Risk Assessment (CCRA3) as our starting point, and in consultation with our stakeholders, key risk areas for inclusion in LCAT have been identified as:

Heat, flooding and drought, extreme storms, coastal security and ocean system changes, and personal security like food or energy supply.

As of November 2022, the prototype health impact maps explore heat (and cold) as well as test the methodology that we are using for the mapping. The other risks will be added by spring 2023.

What are the next steps in the tool's development?

- Exploring how else we might support decision-makers to take a just and equitable approach to climate adaptation

- Updating our climate models
- Updating the climate maps to include Northern Ireland
- Adding to the impact maps with more topics such as flooding and drought, extreme storms, coastal security and ocean system changes, and personal security like food or energy supply.

USING LCAT

How do I use the tool?

The current iteration is a prototype and therefore incomplete and being tested. The idea is that that the tool is easy to use. Users:

- Click on your local area of interest
- A local climate profile will be generated
- In turn this generates an 'impact map' showing users the complex impacts across sectors, upon human health. From November 2022, this prototype looks at heat (and cold)
- A bespoke dataset on vulnerability is also produced to allow a just and targeted approach to adaptation
- Finally, a list of evidence-based recommendations for action is provided https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

Is the tool hard to use or time consuming?

We aim to make the tool as easy as possible for all users. Stakeholders co-designing the tool with us feel capacity and time are barriers and so LCAT must be easy and quick to use, providing bespoke data for local areas within very few clicks.

What can we do with the results?

Once the tool launches officially (it is currently a prototype), the results will help you to:

- Understand your area's future climate
- Understand the likely 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

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

While the tool can be used by any individuals, at any time, the Intergovernmental Panel on Climate Change highlights the importance of areas taking multi-agency, collaborative approaches to climate adaptation. Furthermore, this is the approach our stakeholders wanted to use.

The IPCC suggests that “Maladaptive responses to climate change can create lock-ins of vulnerability, exposure and risks that are difficult and expensive to change and exacerbate existing inequalities. Maladaptation can be avoided by flexible, multi-sectoral, inclusive and long-term planning and implementation of adaptation actions with benefits to many sectors and systems” (p.27 Summary for Policy Makers, 2021.

METHODOLOGY AND DATA

What data sources are you using?

The current iteration of the tool uses climate data from Chess-scape which is an ensemble of four different realisations of future climate for each of four different representative concentration pathway scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5), provided both with and without bias correction. Northern Ireland is not included in this prototype.

What are GWLs?

In response to the growing threat of climate change, the United Nations (UN) Framework Convention on Climate Change brought countries together to create the Paris Agreement, which aims to reduce the risks and impacts of climate change. Climate change is often referred to in terms of Global Warming Levels (GWLs) which 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 2C above pre–industrial levels (GWL of 2C), and to pursue a target of limiting the increase to 1.5C (GWL of 1.5C). 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.

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 representations of 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. 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 this RCP and RCP8.5, which is often referred to as a worst case scenario.

Using the Third UK Climate Change Risk Assessment (CCRA3, 2021), the IPCC Sixth Assessment Report (2022), and additional open access resources, a health impact map is created for individual climate risks; each map identifies the threats, potential health effects, and adaptation opportunities associated with that risk.

Why are clouds important?

Clouds play an important role in our climate as they can both shade the Earth and also trap heat. Which one of these happens in practice will depend on how high they are, the type of cloud and 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.

What data are use using for cloudiness?

The CHESS-SCAPE data does not directly provide a cloudiness variable, so here we have used downward shortwave radiation, which estimates the amount of 'shortwave energy' (this includes visible and ultraviolet (UV) light) that hits the earth surface. As clouds limit the light that hits the earth surface, this measure can be used to estimate cloud cover, because as cloud cover increases, the amount of shortwave radiation hitting the earth's surface will decrease. Future iterations of LCAT will directly use a cloudiness measure.

Why are certain groups more vulnerable to climate change?

Vulnerability to climate change includes personal, environmental and social factors:

- Personal features of the individual may affect their sensitivity to climate impacts

Older people, young children & babies and people in poor health are generally more sensitive to the health effects of climate impacts. For example, during a heatwave, these groups are physically more susceptible.

We use Climate Just data in our tool. Read more from them on children and babies, older people, people in poor health and people with low personal mobility.

- Environmental characteristics may increase or offset exposure to flooding or heat

Environmental characteristics include the type of housing someone lives in and whether someone rents, rather than owns their home. It can also include characteristics of the local area, such as whether there is green space nearby.

For example, a person living in a flat at the top of a high-rise building may be more vulnerable to the impacts of a heatwave, while those homes with basements may be more vulnerable to flooding. Those who rent have less control over what they can do to their home in terms of adaptation as they do not own it. Having green space nearby to where you

live helps lessen some impacts of climate change. For example, trees can offer a cooling effect during a heatwave.

We use Climate Just data in our tool. Read more from them on neighbourhoods with little green space.

- Social and institutional contexts may affect people's ability to adapt.

There are a number of social and institutional contexts which impact people's ability to adapt to a changing climate. For example, poverty, isolation, community cohesion and whether someone lives in an institution such as a care home.

We include a number of datasets to highlight these vulnerable groups in your area including the Index of Multiple Deprivation (IMD) and Climate Just data on factors such as low-income households, unemployment, those new to an area, lone parent & single pensioner households.

More information can be found here:

People who have lived in an area for a short time | Climate Just

People who are socially isolated | Climate Just

People on low incomes | Climate Just

Is the tool open source and free to use?

Yes, the tool is open source and free to use. It is being built in an iterative way and we will be adding more content and topics as we co-design with stakeholders. It is currently in prototype stage. More information can be found on gitlab.

Do I need to input any data or information?

No. Stakeholders challenged us to create a tool that needed little to no input from the user. As such, just by clicking on your local area, the tool provides you with a bespoke output of health and wellbeing impacts, and evidence-based adaptation suggestions.

Why is there no climate data for Northern Ireland?

The November 2022 iteration provides climate data for England, Scotland and Wales. Climate data for Northern Ireland will be added in spring 2023.

The impacts to health and wellbeing are presented in a map, what is this?

The impacts to human health and wellbeing from our changing climate are complex. We have created health impact pathway maps to help decision-makers visualise the complex relationships involved.

Stakeholders we have co-designed the tool with were interested in our use of visuals, to help bring to life this complexity, rather than relying on lots of text.

Is there a methodology to the maps?

Yes. We have created causal loop diagrams using the mDPSEEA conceptual framework (Morris et al., 2006) to represent system dynamics. System dynamics is a field of study that aims to represent the complexity and fluidity of interacting components within a cohesive system. This framework allows us to represent the multivariable nature of climate change impacts on human health from the structural forces to individual human behaviours as a response.

The impact maps are at prototype stage and currently being tested and refined.

What does mDPSEEA stand for?

The abbreviation mDPSEEA stands for "Modified Drivers, Pressures, States, Exposures, Effects and Actions. The 'modification' to the DPSEEA framework (World Health Organization. Regional Office for, 2004) created the addition of social, economic, demographic, and behavioural contexts.

How have you drawn the maps?

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

CLIMATE ADAPTATION OVERVIEW

Why is a focus on Climate Adaptation vital now?

The Climate Change Committee (CCC) has described climate adaptation as the Cinderella of climate change, **"still sitting in rags by the stove: under-resourced, underfunded and often ignored."**

LCAT offers decision-makers data and evidence to not only understand, but plan for the future climate. In doing so, they can ensure the communities they work with, and for, are resilient for a future climate so that risks to health and wellbeing are reduced.'

How do I get in contact with the LCAT team?

Email: lcat@exeter.ac.uk

Disclaimer:

The LCAT project team (University of Exeter, Then Try This, Cornwall Council and The Alan Turing Institute) and their agents, take no responsibility for decisions taken as a result of the use of this tool. While every effort has been made to ensure data represented in the tool are accurate, no liability is accepted for any inaccuracies in the dataset or for any actions taken based on the use of this tool. The views expressed in this tool do not reflect the views of the organisations or the funding bodies. There is no guarantee that the tool will be updated to reflect changes in the source information.


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