The UK Landscape of Community led adaptations to extreme weather events of heat, cold and floods

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Introduction to community-led adaptations and need for search

Extreme weather events becoming more frequent and more intense due to climate change and community-led action on surviving and adapting to extreme weather events is a key part of responding to such emergencies[1,2]. Therefore understanding community led action is of increasing interest for policy, local government, and voluntary sector organisations worldwide. Despite recognition of the need to involve communities in climate change adaptations, existing policy often stops short at consultation and research has more often focused on consequences of climate impacts or institutional responses[3]. As a result there is less work that seeks to understand community-led adaptations to climate change in the UK. Community members, leaders and organisations are often best placed to be the first responders in extreme weather events and identify and help those most at risk. This can be true for both responsive and anticipatory adaptations. Communities often hold expert technical, historic and social knowledge of local land, water and vulnerable community members[4]. Though there are some studies of community-led action relating to different climate risks revealing this insights, addressing inequalities, communicating risk and creating trust[5,6], there is little understanding of the diverse range of community-led adapation activities ongoing across the UK. There is even less work that has brought focus on the implications of community-led action for health and wellbeing.

This report presents the results of a mapping exercise to identify the range of community-led adaptations to extreme weather events in the UK giving attention to how they intersect with health and wellbeing and health inequalities. We use a broad search strategy including published and non-published sources but do not claim this search will have found every community-led adaptation that exists in the UK. We expect that as time passes and the need for climate adaptations to extreme weather increases, that there will be yet more innovation and activity in this area to understand and appreciate. Here, we present analysis that gives important insight into the diverse range of community-led adaptations to extreme weather in the UK, the

1 Ebi K, Vanos J, Baldwin J, Bell J, Hondula D, Errett N, Hayes K, Reid C, Saha S, Spector J and Berry P. (2021). Extreme weather and climate change: population health and health system implications. *Annual review of public health*, vol. 42, no 1, p. 293-315.
2 Ebi, K.L. and Semenza, J.C., (2008). Community-based adaptation to the health impacts of climate change. *American Journal of Preventive Medicine*, *35*, 501-507.
3 Schipper, E.L., Ayers, J., Reid, H., Huq, S. and Rahman, A., (2014). *Community-based adaptation to climate change: Scaling it up*. Routledge.
4 Barr, S. and Woodley, E. (2019). Enabling communities for a changing climate: re-configuring spaces of hazard governance. *Geoforum*, 100, 116-127.
5 Hastie, H., Dawney, L. and Butler, C. (2025). Warm spaces as commoning: Rethinking energy poverty beyond the private doctrine. *Geo: Geography and Environment*, 12(1).
6 Guardaro, M., Messerschmidt, M., Hondula, D. M., Grimm, N. B., & Redman, C. L. (2020). Building community heat action plans story by story: A three neighborhood case study. *Cities*, 107: 102886.

nature of interventions and responses being enacted, and their value and importance as part of responses to climate change with particular focus on health and wellbeing. This serves as a source of both information and inspiration for those concerned with climate change adaptation and the role of communities within it.

A summary of kinds of community-led action is given in Fig 1 below. We then go on to explain our methods, and present more details about community led actions for extreme weather events of heat, cold and floods.

Fig 1 Model summarising types of community-led adaptation to extreme weather events

2

Methods and definitions

We anticipated that much of the information available on community-led adaptations to extreme weather events was likely to be available in diverse sources so did not restrict our research to peer reviewed research papers. Instead, we included in our review 'grey literature', websites, and expert elicitation from UK stakeholders to build insight into the diverse range of activity ongoing in communities that could broadly be understood as adapation.

Communities do not necessarily describe their actions as climate change adaptations. For this reason, we have created our own set of relevant definitions to identify what we are treating as climate adaptation and community-led. To focus our search our team agreed the following working definitions and parameters for the weather events/climate impacts we examine, for what we count as community-led adaptations, and for how we characterise health and well-being. These working definitions are given below in Box 1 and as these terms may have other meanings and uses we have also included some discussion around our understanding of and the limitations of these definitions.

BOX 1
Definitions for community adaptations to climate change related extreme weather events

- **Extreme weather events:**
  Extremes of heat, cold or floods that are unusually severe for the UK climate
- **Health and wellbeing:**
  Health and wellbeing (physical, social and psychological) at risk due to heat, cold and floods
- **Community-led adaptations:**
  "Adaptations" are defined as deliberate, collective actions that react to the weather extremes plus deliberate actions that reduce risks pro-actively in advance of those risks occurring. "Community" is defined as people living in the same locality (mainly) or affected by a particular experience who are not representing private or public sector roles. Therefore "community-led adaptations" are defined as activities where that the community leads on or has a major role in design and/or delivery.
- **Climate change adaptations:**
  Adaptations that could be useful for adapting to climate change.

Extreme weather events

There are extensive debates about what is a disaster is, and what is extreme, and we recognise they can socially constructed terms with different geographic relevance[7]. For this project, we focused on action responding to some of the key weather risks in the UK of heat, floods, and cold. We selected heat and flood risks as two of the key impacts facing the UK and requiring adaptation[8,9,10]. We also included cold as the most significant current threat to health from weather for the UK, which evidence shows will not decline even with climate change until much later in the century[11]. Its current place as a significant threat to health and wellbeing and widespread forms of action also make it an important risk to give attention to in terms of adaptation as there are notable intersections between responses to this risk and heat that might otherwise be missed.

We opted not to use specific ranges in defining heatwaves, cold or flooding as we reflected that narrowing at the outset in this way might lead us to miss relevant projects. What counts as extreme heat or cold may depend on individual vulnerabilities, for example, +10°C may be cold enough to hospitalise someone with sickle cell disease, +5°C could potentially trigger a heart attack in someone with a pre-existing heart condition, and prolonged moderate cold has been shown to have the most significant impacts for health and mortality[12]. We prioritised our analysis of the impacts of flooding and heat and cold stress on health and wellbeing bringing focus on responses involving particularly vulnerable groups.

Health and wellbeing

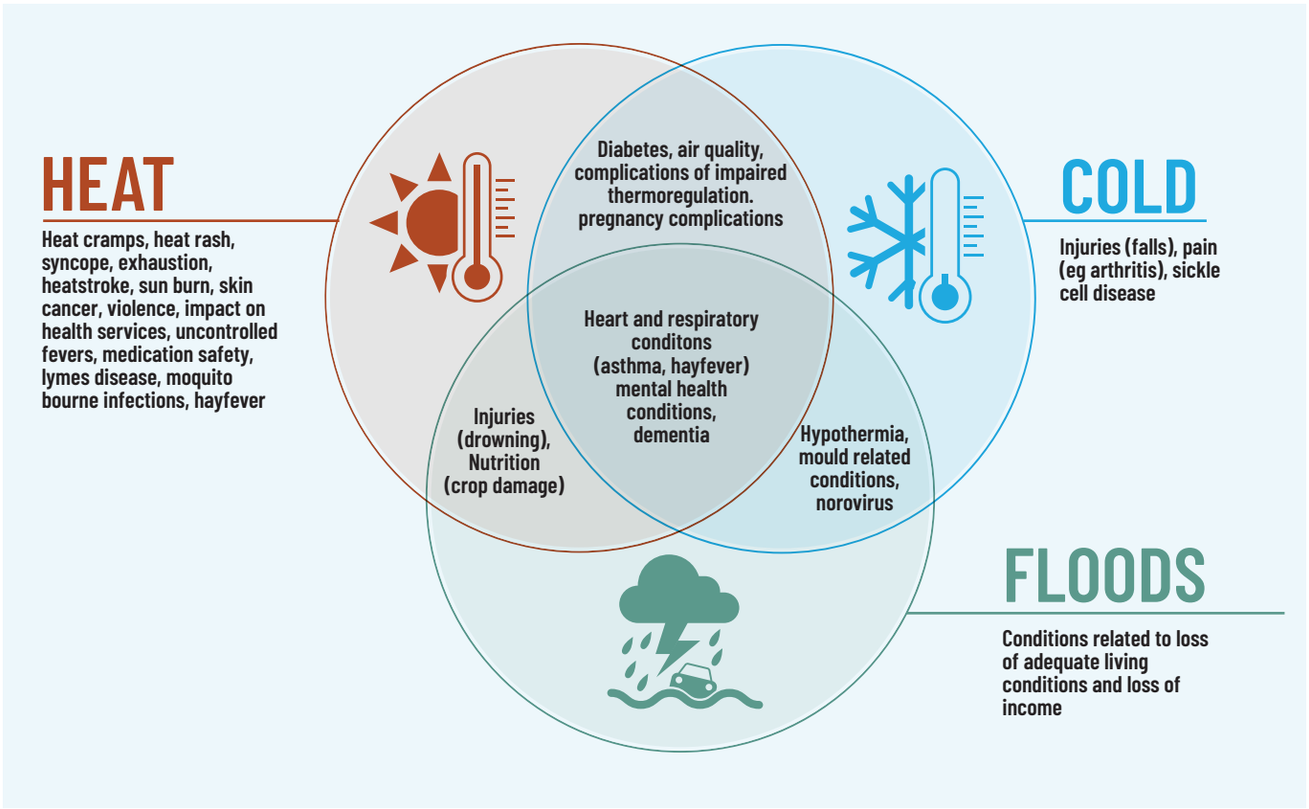
We have taken a broad approach to how we define health and wellbeing that goes further than just the absence of disease and considers overall social, physical and mental wellbeing[13]. We are also interested in social determinants of health outcomes and how the environment can impact on people's health. To characterise the health impacts we reviewed existing literature on the health and wellbeing impacts of this weather related risks, the outcomes of which are presented below. We found some of the health outcomes were different depending on the weather risks, but some health risks were common to all[14,15,16,17,18]. This is reflected in the middle section of the Venn diagram below.

Community-led adaptation

We have defined "adaptations" as deliberate, collective actions that react to the weather extremes plus deliberate actions that reduce risks pro-actively in advance of those risks occurring. We focused on collective actions (so excluding private adaptations for individual gain, or individual actions) by civil society (even if supported by public sector). These are adaptations done with health-related risks of heat, cold and floods in mind. We recognise that individual actions are important in climate adaptations but perhaps deserve a whole review in themselves. However, in terms of effectiveness one could conflict or help the other. For example, insulating houses for cold weather make them hotter for heatwaves, painting houses with reflective paint may keep them cooler in summer but make them colder in winter.

7 Meyer, A., Bresson, H., Gorodetskaya, I. V., Harris, R. M., & Perkins-Kirkpatrick, S. E. (2023). Extreme climate and weather events in a warmer world. *Clim. Change*, *44*, 682759.
8 Arnell, N.W., Freeman, A., Kay, A.L., Rudd, A.C. and Lowe, J.A., (2021). Indicators of climate risk in the UK at different levels of warming. *Environmental Research Communications*, *3*, 095005.
9 Butler, C., Walker-Springett, K. and Adger, W.N., (2018). Narratives of recovery after floods: Mental health, institutions, and intervention. *Social Science and Medicine*, 216, 67-73.
10 Milojevic, A., Armstrong, B., Kovats, S., Butler, B., Hayes, E., Leonardi, G., Murray, V. and Wilkinson, P., (2011). Long-term effects of flooding on mortality in England and Wales, 1994-2005: controlled interrupted time-series analysis. *Environmental Health*, 10, 1-9.
11 Staddon, P. L., Montgomery, H. E., & Depledge, M. H. (2014). Climate warming will not decrease winter mortality. *Nature Climate Change*, *4*(3), 190-194.
12 Duarte-Davidson, R., Gillingham, E. L., Phalkey, R., & Berrang-Ford, L. (2024). Health Effects of Climate Change in the UK report 2023. *European Journal of Public Health*, *34*(Supplement_3), ckae144-358.
13 Krahn, G. L., Robinson, A., Murray, A. J., Havercamp, S. M., Havercamp, S., Andridge, R., ... & Witwer, A. (2021). It's time to reconsider how we define health: Perspective from disability and chronic condition. *Disability and health journal*, *14*(4), 101129.
14 Macintyre, H.L., Mitsakou, C., Thompson, S., Aldridge, S., Exley, K.S., Guercio, V., Heal, M.R., Vieno, M. and Heaviside, C., 2023. Health effects of climate change (HECC) in the UK: 2023 report. https://www.gov.uk/guidance/health-effects-of-climate-change-hecc-report
15 Liddell, C. and Morris, C., 2010. Fuel poverty and human health: a review of recent evidence. *Energy policy*, *38*(6), pp.2987-2997.
16 Obeagu, E.I. and Obeagu, G.U., 2024. Implications of climatic change on sickle cell anemia: A review. *Medicine*, *103*(6), p.e37127.
17 Vallianou, N.G., Geladari, E.V., Kounatidis, D., Geladari, C.V., Stratigou, T., Dourakis, S.P., Andreadis, E.A. and Dalamaga, M., 2021. Diabetes mellitus in the era of climate change. *Diabetes & Metabolism*, *47*(4), p.101205.
18 Quinn, T., Heath, S., Adger, W.N., Abu, M., Butler, C., Codjoe, S.N.A., Horvath, C., Martinez-Juarez, P., Morrissey, K., Murphy, C. and Smith, R., 2023. Health and wellbeing implications of adaptation to flood risk. *Ambio*, *52*(5), pp.952-962.

Fig 2 Health conditions exacerbated by heat, cold and floods.



We have defined "community" as people living in the same locality (mainly) or affected by a particular experience who are not representing private or public sector roles. This essentially involves deliberate adaptation actions (both reactive and pro-active) broadly distributed action within a community of locality. A locality-based concept of community works well for floods. However, for heat and cold much of the action (e.g. advocacy for policy change, funding streams) is provided by national charities (e.g. National Energy Action (NEA), Age UK, Citizens Advice), although some services (e.g. financial advice, grant making) may be organised at a national level but delivered at a local level, including for example retrofitting all houses in a street/neighbourhood. In essence, it is the community/voluntary sector providing the heat and cold adaptations. In terms of inequalities there may also be some interest-based communities based on a minority ethnic group, low-income groups or health conditions. We, therefore, kept to locality for floods, but for heat and cold look at interest-based networks and their actions in specific localities. We have focused on collective action rather than individual action, although we acknowledge individual community members may also have significant impact.

Therefore we define "community-led adaptations as activities that the community leads on or has a major role in design and/or delivery. We looked for a higher level of community involvement than consultation. Many activities tend to be in partnership with community and private and public sectors in terms of innovation, funding, and delivery. We weren't looking at public or private sector actions that were 'community-based' as this did not fit our criteria of adaptations where the community was leading on the adaptation.

Climate change adaptations

We used a broad definition of adaptations where these could be useful for adapting to climate change. We could not easily separate severe heat, cold, and flooding events from those that are and are not a

result of climate change, with the exception of coastal impacts of sea level rises. We were also unlikely to find adaptations that separate 'normal' heat, cold and flood events from climate change related ones. We also didn't exclude adaptations that weren't defined as such by the organisations doing this work, hence the need for the above set of definitions to help guide our search.

Between November 2023 and April 2024 we spread our net wide using above definitions in Box 1 and the following sources in Box 2 to look for examples of community-led interventions in the UK. The search was mainly conducted by one researcher in our team but also involved input from the whole team and focus groups with people involved in community-led adaptations to extreme weather across the UK.

We created a detailed list of the interventions in Microsoft Excel. This was not intended to be an exhaustive list of all relevant projects, but it provided a reasonable picture of the diversity, depth, and breadth of work taking place with relevant examples of ongoing community-led activity. We worked to saturation of adaptation type i.e. we did not put multiple examples of similar adaptations.

The headings for the information contained in this list were the following:

- Name of adaptation/project
- Description
- Stakeholders
- Location
- Example of multiple similar projects
- Community type (e.g. charity, community organisation, individual

BOX 2
Sources for search of community-led adaptations to extreme weather events

- Focus group:
  consulting people involved with communities and extreme weather events
- Government reports
- Journal articles
- National media – newspapers, TV, radio news
- Newsletters on these topics
- Websites:
  Funders (e.g. National Lottery, Community Foundations), community organisations working on issues of heat/cold/floods (eg Wildlife Trusts, National Energy Action)
- Social media:
  Snowballing via social medica by following these topics on Facebook, X (formerly Twitter), Instagram and TikTok and allowing algorithms to suggest other relevant material
- Team knowledge

3

What we found Community-led adaptations in the UK: Mapping the landscape of interventions for health and wellbeing

We found 122 community-led climate change adaptation projects (listed in full at the end of the report with relevant links). We soon found that many of the adaptations could be classified as cross-cutting rather than distinctly for heat, cold or floods. For example, community organisations may provide emergency shelter from flooding or extreme heat or cold. Another example was addressing energy poverty, which is relevant to keeping vulnerable people cool as much as it can be about keeping people warm, bolstering our sense that is important for on the ground action to consider these risks and responses together. Box 3 below, presents the number of adaptations found for each of these four categories.This highlights the far higher level of community action relating to cold and flood risks that for heat. The relatively higher number within cold potentially suggests the importance of integrating considerations for responses to heat within action currently directed toward cold only. The existence of cross-cutting projects suggests this is already happening in some instances and could be bolstered further by emphasising the increasing importance to consider both risks in responses.

After analysing the range of adaptations, we then created mind maps using Microsoft Visio to set out the different adaptations. This helped us identify categories for the types of community-led adaptations for floods, heat, and cold. These categories are given below, alongside one or two examples of community-led adaptations for examples in each category, in Box 3 below. The full list/table can be found below and other wider examples can also be found on the Healthy Adaptations website (https://healthyadaptations.org.uk/).

BOX 3
Number of UK community-led adaptations found for floods, heat, cold and cross-cutting these three risks

RISK	NUMBER OF PROJECTS
FLOODS	34
HEAT	6
COLD	40
CROSS-CUTTING	42

Fig 3 Detailed version of community-led interventions with examples - Heat

Drowning is most common among people on hot days. Here, community-led organisation, Loch Ken Trust, are teaching young people lifesaving skills with real world

This detailed work was then further synthesised into a graphic to demonstrate for all types of community-led adaptations in Fig1. There have been previous classifications of climate adaptation types, such as the four types of adaptations mentioned in the article O'Neil and colleagues[19]. These four types of adaptation actions are infrastructural, institutional, behavioural, and nature-based options. Another breakdown of types of flood response is in Quinn and colleagues' [20] paper on flood adaptations which are listed as i) hard infrastructure ii) living with risk and iii) Relocation. However, we did not feel the community-led adaptations we had reviewed fitted well with these frameworks, and felt there was value in developing our own typology to characterise the nature of ongoing responses from communities.

The types of community-led action for heatwaves included community information campaigns, first aid, drowning prevention, and nature-based solutions.

Community events included information campaigns such as the Sickle Cell Society giving guidance about how to cope with the heat and distribution of Emmaus Hull and East Riding having an outreach pod to enable them to distribute water and sunscreen to the homeless and the Refill Network sharing locations where people can get free drinking water.

Heatwaves can be peak times for water related casualties and extreme pressure on emergency services dealing with complex rescues. 15-19 year old males are high risk for drowning in the UK, second

19 O'Neill, B. C., M. van Aalst, Z. Zaiton Ibrahim, L. Berrang-Ford, S. Bhadwal, H. Buhaug, D. Diaz et al. "Chapter 16: key risks across sectors and regions. Climate change 2022: impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change." (2022).

20 Quinn, T., Heath, S., Adger, W.N., Abu, M., Butler, C., Codjoe, S.N.A., Horvath, C., Martinez-Juarez, P., Morrissey, K., Murphy, C. and Smith, R., 2023. Health and wellbeing implications of adaptation to flood risk. *Ambio*, *52*(5), pp.952-962.

Type of adaptation	Intervention	Examples/references
Community events	Information campaigns (timing, risk assessment)	UK Heatwave Guidance » Sickle Cell Society
	Water availability	The Refill Network Emmaus Outreach pod
	Sunscreen availability	Sun Safe Schools
Community first aid	Cool spaces; evacuations and drop-in centres (Cooling for heat stress related conditions)	Directory of welcome spaces in Bristol and South Gloucestershire from The Care Forum
	First aid training and networks (Community first aiders to treat mild effects of heat)	St John's Ambulance first aid training courses Royal Life Saving Society UK schools life saving training
	Defibrillator networks (Community action for cardiac arrest, fundraising, volunteers to maintain (For open water incidents)	The Circuit UK community defibrillator network Exact location finder for outdoor emergencies What3Words GoodSam platform for local first responders
	Outdoor location apps (For emergency services to locate cardiac arrest patient if outdoors)	Exact location finder and check in as safe for emergencies at sea SafeTrx
	Wildfire fighting equipment/drowning equipment (For community to take action before emergency services arrive)	Royal Life Saving Society UK map/app of water rescue equipment
Drowning/cold water shock prevention	Open water swimming safety training/ information	How to acclimatise – Outdoor Swimming Society Outdoor Swimming Society
	River level information (Safe times and places to swim)	Online river level information
	Water safety and rescue equipment	Ember Aquatics
Nature-based solutions	Green walls, roofs, hanging gardens, urban tree planting (Reduce heat island effect, provide shade)	Royal Horticultural Society green wall project Woodland trust donating trees for communities to plant
	Restoring peat bogs, rural tree planting for wildfire prevention (Burns, respiratory conditions - air pollution), beaver reintroduction for water retention to prevent drought	Rewilding and wildfire prevention | Rewilding Britain Community monitoring of moorland burning The Ealing Beaver Project
	Considering if and where to plant high pollen producing trees such as Birch (To reduce hayfever/asthma)	Asthma UK demonstration garden

Fig 4 Detailed version of community-led interventions with examples - cold

Community-led organisations are often best placed for community members to open up to when experiencing the stigma of not being able to heat their home

only to toddlers, and most likely on days ≥25°C[21,22]. Community-led action addresses water safety through open water safety training and promoting information about tides and currents such as the Outdoor Swimming Society providing information on how to acclimatise to cold water for outdoor swimming. Community first-aid is often critical where community members have immediate access to those at risk, especially in the absence of services. Examples of community first aid found include a network of cool spaces shared on the Bristol and South Gloucestershire Care Forum, defibrillator networks through Circuit UK, St John's Ambulance providing first aid training and local responder networks using the GoodSam platform to connect with people close by who are trained in CPR.

There are also location apps such as What3Words and SafeTrx to find casualties outdoors and the Royal Life Saving Society has a map to find equipment for drowning and wildfire emergencies.

Nature-based solutions for shade and water retention include developing green roofs and walls by the Royal Horticultural Society, and urban tree planting to reduce the heat island effect in cities and provide shade, Rewilding Britain promote restoring bogs and planting trees can prevent wildfires through retention of water. In Ealing, Northwest London Beavers have been reintroduced and are helping the area retain water. Asthma can be exacerbated by hay fever in summer months so Capel Manor Gardens in North London

21 Hills, S.P., Hobbs, M., Brown, P., Tipton, M. and Barwood, M., 2024. Association between air temperature and unintentional drowning risk in the United Kingdom 2012–2019: A nationwide case-crossover study. *Preventive medicine*, *179*, p.107832.
22 Playter, K., Hurley, E., Lavin-Parsons, K., Parida, K., Ballinger, Z., Wong, K. and Valente, A., 2024. Water safe Worcester: student-led drowning prevention in an adolescent underserved population. *Frontiers in public health*, *12*, p.1387094.

worked with Asthma UK to create a low allergen garden to demonstrate how people with asthma can enjoy outdoor spaces with reduced exposure to mould and pollen.

The various community-led action to protect vulnerable community members from extreme cold include providing emergency funds to pay fuel bills, advocacy and advice to negotiate bills and unfair treatment from energy providers and share warm spaces, clothing and bedding. Some community organisations also help people find funds needed for new boilers or energy efficiency improvements to their home.

There are a few national charities working in this space such as the Trussell Trust who are now helping people pay fuel bills as well as provide food. National Energy Action and Citizens Advice have both local and national networks helping people reduce their bills and they work directly to change government and energy provider policies. Fuel Poverty Action campaigns and advocates for energy justice. There is a growing network of community energy organisations working towards sustainability and the energy transition through locally generated and controlled energy and that provide energy advice and support to community members. Other projects include checking in on vulnerable neighbours such as with Snow Angels and opening up community spaces for people to stay warm, spaces shared via the Warm Welcome Campaign. Help Us Wrap Up and Knit for Peace distribute warm clothing and KipBag provide tents and sleeping bags for the homeless.

Community-led action for flooding includes emergency response and planning to prevent future floods, nature-based solutions to slow and retain water flow and in some circumstances hard engineering solutions- even though the latter is more of a focus for local and national government action.

Type of intervention	Intervention	Example
Voluntary sector adaptation	Food banks providing funds for fuel bills, or Fuel Banks	Energy bills support - The Trussell Trust Home | Fuel Bank Foundation
	Advocacy to address policies such as campaigning against forced pre-payment meter installation or accessible energy prices	Out of the cold? Helping people on prepayment meters stay connected this winter - Citizens Advice Energy For All
	Warm spaces	Warm Welcome Campaign
	Information network and capacity building for voluntary sector and policy makers	Membership - National Energy Action (NEA)
	Snow angels/buddying	Snow Angels CIC
	Supervision of energy company redress schemes	National Energy Action's response to government consultation
	Community energy	The Voice of the Community Energy Sector | Community Energy England
	Financial advice for debts, income, bills	Get help with the cost of living - Citizens Advice
	Organising warm clothing distribution, knitting campaigns	Help Us Wrap Up. Distributing winter coats (wrapupuk.org) Knit for Peace – knitting for good causes
	Homeless support – tents, sleeping bags	KipBag | Essential items for those sleeping rough
	Evidence and innovation sharing	Fuel Poverty Research Network

Fig 5 Detailed version of community-led interventions with examples – floods

Community-led organisations are often in the position to be the first responders in extreme weather events

The various types of community responses to flooding include flood action groups coordinated through the National Flood Forum that communicate information of impending flooding and support during a flood such as distributing sandbags, helping evacuate residents and clean up after floods. The Red Cross can evacuate people and provide temporary accommodation, and there are many voluntary search and rescue teams trained and equipped to help people in a local emergency.

Nature based solutions are mostly about prevention of future flooding. The Dee Catchment Partnership brings together various communities along a whole river catchment area to re-meander a river and 'slow the flow'. Beaver reintroduction such as the Welsh Beaver Project are often managed by community sector groups and have also been successful in slowing the flow. As well as tree planting and bog restoration such as the work by Devon Wildlife Trust in wetland areas and The Yorkshire Peatland Partnership led by Yorkshire Wildlife Trust, community groups are arranging for de-culverting in cities such as Bradford and The Royal Horticultural Society is promoting urban concreted areas are replaced with soil to reduce runoff in urban areas. Although larger 'hard engineering' projects such as building sea and river walls are usually managed by local or national government, various schemes by Community Foundations in the UK distribute funding for repairs after flooding and also preventing future damage such installing non-return drainpipes; airbrick covers, levees and walls around properties; window and door flood barriers and raising plug sockets to above 3 foot.

Type of intervention	Intervention	Example
Community action in response to floods	Flood Action Groups	National Flood Forum oversees local flood forums
	Climate forums	Climate Action Leeds community led nature-based solutions and energy and food justice
	Placing of temporary barriers (sandbags, gates, inflatable barriers)	Community flood forum advice for building temporary flood barriers with sandbags
	Communications	Flood wardens communicate flood alerts to community Comprehensive UK river level data website by an individual
	Rescue of stranded community members and pets	Suffolk search and rescue team rescues people in floods
	Relocation	Temporary shelters provided by the Red Cross
	Clean up/repairs	1000 volunteers helped clean up after floods in Leeds in 2015 (see graphic)
Nature-based solutions to reducing flood risk	Slowing the flow (moorland restoration, re-meandering rivers, instream structures, beaver rewilding)	The Dee Catchment Partnership is involved in slowing the river by restoring its meandering course and placing fallen trees and branches in the river The Welsh Beaver Project is making preparations for beaver reintroductions in Wales
	Rewilding built environment (campaigns to replace artificial lawns and concrete with natural spaces, de-culverting, green roofs and walls)	The Royal Horticultural Society are campaigning against artificial turf The Royal Horticultural Society are promoting reducing concrete cover in cities through creating 'rain gardens' 'Daylighting' – culverts are being removed in Bradford to reduce underground flood damage
	Water retention/storage (rewilding inland wetlands and salt marshes, quarries, tree and hedgerow planting)	Ulster Wildlife published a youth manifesto to campaign for rewilding projects in Northern Ireland, including peatland and woodland restoration Devon Wildlife Trust are restoring wetlands Wildfowl and Wetlands Trust are restoring salt marshes to provide buffer zones in flooding Yorkshire Peat Partnership restoring peatland
Hard engineering	Adaptations to building (non-return drainpipes; levees and walls around properties; install window and door flood barriers; raising plug sockets to 3'+; catch basin outside property; airbrick covers	Community Foundations have funded rebuilding after floods

Conclusions and recommendations

We hope these results will contribute to a greater understanding of the breadth and depth of various community led adaptations to extreme weather and climate change, in particular where this work has not historically been identified as contributing to climate adaptation to extreme weather events. We hope communities will be inspired by this recognition to keep leading their work on climate adaptations, and that this report will highlight to all stakeholders who work with and depend on community action, the scale and importance of community-led adaptation to climate change.

We would welcome debate on changes to our adaptation model, including for additional climatic risks to heat, cold and floods.

Ethics approval:
This project has received ethical approval from the Department of Geography Ethics Committee, University of Exeter

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Fig 3: Loch Ken Trust

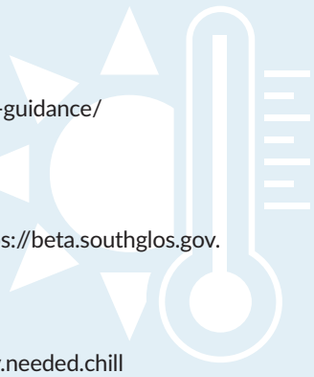
Fig 4: Matthew (unsplash.com), Bilanol (stock.adobe.com), Pixel-shot (stock.adobe.com)

Fig 5: John Dal, Loch Ken Trust, ESRC funded Winter Floods Project

Full links for websites cited above

The full links of the examples are listed below in case readers can't open the integrated links

Heat



- UK Heatwave Guidance » Sickle Cell Society https://www.sicklecellsociety.org/uk-heatwave-guidance/
- The Refill Network https://www.refill.org.uk/
- Emmaus Outreach pod https://emmaus.org.uk/hull/emmaus-launches-new-outreach-pod/
- Sun Safe Schools https://www.sunsafeschools.co.uk/
- Directory of welcome spaces in Bristol and South Gloucestershire from The Care Forum https://beta.southglos.gov.uk/community-welcome-spaces/
- Water safety and rescue equipment https://www.embersaquatics.com/
- The Circuit UK community defibrillator network https://www.thecircuit.uk/
- Exact location finder for outdoor emergencies What3Words https://what3words.com/pretty.needed.chill
- GoodSam platform for local first responders https://www.goodsamapp.org/
- Exact location finder and check in as safe for emergencies at sea SafeTrx https://www.rya.org.uk/water-safety/communication/safetrx/
- Royal Life Saving Society UK map/app of water rescue equipment https://www.rlss.org.uk/goodsam
- How to acclimatise to outdoor waters – Outdoor Swimming Society Outdoor Swimming Society https://www.outdoorswimmingsociety.com/how-to-acclimatise-to-cold-water/
- River level information (Safe times and places to swim) – online https://riverlevels.uk/
- Royal Horticultural Society green wall project https://www.rhs.org.uk/science/plant-health-in-gardens/entomology/rhs-projects-on-plant-pests/green-walls-and-biodiversity
- Woodland trust donating trees for communities to plant https://www.woodlandtrust.org.uk/plant-trees/schools-and-communities/
- Rewilding and wildfire prevention | Rewilding Britain https://www.rewildingbritain.org.uk/why-rewild/benefits-of-rewilding/how-rewilding-reduces-wildfire-risk
- Community monitoring of moorland burning https://moorlandmonitors.org/heather-burning/
- The Ealing Beaver Project https://theealingbeaverproject.com/
- Asthma UK demonstration garden https://www.capelmanorgardens.co.uk/whats-here/gardens/low-allergen-garden/

Cold

- Energy bills support - The Trussell Trust https://www.trussell.org.uk/help-and-advice/energy-bill-support
- Home | Fuel Bank Foundation https://www.fuelbankfoundation.org/
- Out of the cold? Helping people on prepayment meters stay connected this winter - Citizens Advice https://www.citizensadvice.org.uk/policy/publications/out-of-the-cold-helping-people-on-prepayment-meters-stay-connected-this-winter/
- Energy For All https://energyforall.org.uk/
- Warm Welcome Campaign https://www.warmwelcome.uk/
- Membership - National Energy Action (NEA) https://www.nea.org.uk/membership/
- Snow Angels CIC http://media.claspinfo.org/sites/default/files/AHSA_Case%20Study_Web.pdf
- National Energy Action's response to government consultation https://www.ofgem.gov.uk/sites/default/files/2021-06/nea.pdf
- The Voice of the Community Energy Sector | Community Energy England https://communityenergyengland.org/
- Get help with the cost of living - Citizens Advice https://www.citizensadvice.org.uk/debt-and-money/cost-of-living/get-help-with-the-cost-of-living/
- Help Us Wrap Up. Distributing winter coats (wrapupuk.org) https://wrapupuk.org/
- Knit for Peace – knitting for good causes https://www.knitforpeace.org.uk/about
- KipBag | Essential items for those sleeping rough https://www.kipbag.com/kipbags/
- Fuel Poverty Research Network https://www.fuelpovertyresearch.net/

Floods

- National Flood Forum oversees local flood forums https://nationalfloodforum.org.uk/working-together/communities/what-is-a-flood-action-group/
- Climate Action Leeds community led nature-based solutions and energy and food justice https://www.climateactionleeds.org.uk/
- Community flood forum advice for building temporary flood barriers with sandbags https://cornwallcommunityfloodforum.org.uk/wp-content/uploads/2019/05/Community-Volunteer-Booklet-Sandbags_WEB.pdf
- Flood wardens communicate flood alerts to community https://wiltshireandswindonprepared.org.uk/prepare/prepared-communities/flood-wardens
- Comprehensive UK river level data website by an individual https://riverlevels.uk/
- Suffolk search and rescue team rescues people in floods https://sulsar.org.uk/about-us/
- Temporary shelters provided by the Red Cross https://www.redcross.org.uk/stories/disasters-and-emergencies/uk/how-the-british-red-cross-helps-during-a-flood
- 1000 volunteers helped clean up after floods in Leeds in 2015 (see graphic) https://www.mylearning.org/stories/what-happens-when-it-floods/1132
- The Dee Catchment Partnership is involved in slowing the river by restoring its meandering course and placing fallen trees and branches in the river https://www.scotlandbigpicture.com/rewilding-stories/a-river-runs-through-it
- The Welsh Beaver Project is making preparations for beaver reintroductions in Wales https://www.wildlifetrusts.org/saving-species/beavers
- The Royal Horticultural Society are campaigning against artificial turf https://www.bbc.co.uk/newsround/61494014
- The Royal Horticultural Society are promoting reducing concrete cover in cities through creating 'rain gardens' https://www.rhs.org.uk/garden-features/rain-gardens
- 'Daylighting' – culverts are being removed in Bradford to reduce underground flood damage https://theconversation.com/many-urban-rivers-are-hidden-underground-daylighting-them-would-bring-nature-back-to-cities-128441
- Ulster Wildlife published a youth manifesto to campaign for rewilding projects in Northern Ireland, including peatland and woodland restoration https://www.nicva.org/sites/default/files/d7content/attachments-articles/ulster_wildlife_-_youth_manifesto.pdf
- Devon Wildlife Trust are restoring wetlands https://www.devonwildlifetrust.org/working-wetlands-project
- Wildfowl and Wetlands Trust are restoring salt marshes to provide buffer zones in flooding https://www.wwt.org.uk/news-and-stories/news/wwt-joins-group-helping-to-unlock-1bn-investment-in-restoration-of-saltmarshes
- Yorkshire Peat Partnership restoring peatland https://www.wildlifetrusts.org/peatlands-examples-our-work
- Community Foundations have funded rebuilding after floods https://www.ukcommunityfoundations.org/news/community-foundations-respond-to-flood-appeals

Outputs from the other activities can be found on our webpages below:

SPHR NIHR
Phase 1 project page
LINK:
https://sphr.nihr.ac.uk/research/evaluating-community-led-interventions-to-maximise-the-health-and-well-being-of-climate-change-adaptations-for-extreme-events/

SPHR NIHR
Phase 2 project page
LINK:
https://sphr.nihr.ac.uk/research/evaluating-community-led-interventions-to-maximise-the-health-and-wellbeing-of-climate-change-adaptations-for-extreme-events-phase-2/

Healthy adaptations website
LINK:
https://healthyadaptations.org.uk/

Summary of project this report was produced for Extreme weather events such as floods and heatwaves are increasing across the UK due to climate change this as a major risk to health. The project "Evaluating Community-led Interventions To Maximise The Health and Well-being Of Climate Change Adaptations for Extreme Events" aims to understand how groups of people within diverse communities can act to reduce the health consequences of floods, heatwaves, and cold waves. Community-led action in preventing flood impacts, and in helping to deal with heatwaves or extreme cold weather, can keep people safe and reduce the health burden especially on particularly vulnerable or marginalised populations. However, the benefits of community-led action have not been well-documented, and this project seeks to learn lessons from how community action has worked in the past, and ultimately to evaluate its success for health purposes. This report is part of a bigger project where we also have produced a literature review and case studies.

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