

Alan Kennedy-Asser University of Bristol & Climate Northern Ireland October 2022

Context

The town of Castlederg in Co. Derry/Londonderry currently holds the record for being both the hottest and coldest place in Northern Ireland (at the time of writing). Between the maximum temperature during the heatwave of 2021 (31.3 °C) and the minimum of the winter of 2010 (-18.7 °C), a 50 °C temperature range has been recorded in the past 12 years. Many UK studies of heat extremes focus on urban areas, due to the amplification effect of the urban heat island, however, in Northern Ireland the warmest temperatures are often recorded in rural areas, particularly in the west of the country. This report looks at the impacts of these heat extremes on a rural community, as well as highlighting steps that have been taken in Castlederg to improve resilience to such extremes. Many of these steps were taken at an individual grass roots level and could be seen as 'common sense', however they are generally in line with advice in other warmer regions, such as England, and show how climate adaptation practices can in many cases be easily adopted. It is hoped these steps can be adopted elsewhere in Northern Ireland to adapt to rising global temperatures.

Data collection

On 21st July 2022, a year on from the temperature record set in 2021, a number of semi-structured interviews were carried out with members of the local community in Castlederg, particularly those in positions of care. Additionally, a number of informal conversations were had with other local people throughout the day, for example in the library and local businesses. Some follow up phone calls and emails were made to reach other relevant stakeholders who could not meet on 21st July. An engagement activity was also run with a local youth summer scheme (see box *The Castlederg Temperature Scale*). In this report, interviewees will be left anonymous, however the context of their work will be stated if relevant. Given the nature of this short one-day study, it should not be seen as exhaustive, however valuable information can still be learnt which could be shared with other communities in Northern Ireland and beyond.



Local microclimate

Castlederg's extremes of temperature are largely the result of its local topography (1). It sits in a hollow, which reduces mixing of air (advection) from elsewhere meaning that when stable high pressure conditions set in, either in summer or winter, the air temperature continues to rise or fall. This was the case in 2021, when air pressures were high resulting in largely cloud-free conditions over Northern Ireland (2). The local topography and lack of advection can also result in high humidity, which can contribute to discomfort and heat stress during warm conditions. During the heatwave of 2021, the diurnal (daily) variability in temperature in Castlederg was shown to be quite large compared to eastern areas which have more of a coastal influence and therefore generally cooler days but warmer nights (2). More extreme summer temperatures are projected for Castlederg with increased global warming. If the global climate were to warm by 3 °C above pre-industrial levels, maximum summer temperatures could be up to 5 °C hotter than those expected in the present climate (3).

Hot summer conditions are often followed by periods of heavy, intense rainfall. This was the case following the heat in 2022, when very intense rainfall led to some surface water flooding in Castlederg (4). It may be worth considering these as compound climate hazards in future research.

The Castlederg Temperature Scale

While visiting Castlederg, an activity was run with an Education Authority youth summer scheme to engage 9-12 year olds with Castlederg's unique weather. The 25 young people produced a scale of words they would use to describe the temperature then decided where that day fitted on the scale compared to two recent heatwaves. Temperatures in the high teens can be described as 'cold', 'cool' or 'in between', while temperatures around 30 °C can be described as 'sizzling', 'roasting', 'scalding' or 'dying'. They also had sound advice on how to deal with the heat, including eating ice lollies, relaxing and ventilating, either by opening windows, using fans or going on swings!



Local attitudes

Local people, including the care providers interviewed for this for this report, those met around the town and young people at the summer scheme, were largely aware of how extreme the temperature in the area was. Some were even particularly aware of the dates and magnitudes of temperature extremes ("over 30 °C" to "almost -20 °C"). Recent media coverage during Summer of 2021 likely added to this understanding.



Anecdotally, impacts of high temperatures (and humidity) were mentioned regularly, although any adaptations made to respond to this heat were generally not viewed as being prohibitive. Older residents of sheltered accommodation mentioned simply staying indoors and not doing activities on hot days such as 18th July 2022, when the maximum temperature was 29.8 C. Likewise, a group of people met at the library described 18th July 2022 as "unbearable" and tried where possible to stay at home and out of the sun on extreme days like that. This group generally seemed aware of good practice for keeping their houses cool, including opening windows early or late in the day, closing them during the peak of the heat and ensuring blinds and curtains were shut during the day.

For others, there was an attitude of having to 'get on with things'. A worker who maintained boilers in care settings mentioned that any weather extreme can be a challenge, and that even during hot weather often boilers are running to provide hot water and there is no option but to get into a hot boiler shed to carry out maintenance. Other businesses mentioned minor impacts too, such as a local garden centre having to increase watering during hot spells and a pub noticing a change in customer behaviour with a preference for shade indoors, while staff must continue in the kitchen even when it is hot.

Despite awareness of heat extremes, other adverse weather including cold extremes, heavy snow and heavy rainfall were also of high or potentially higher concern to many of those spoken too. Moderately cold conditions were often described as tolerable, simply by wearing more layers or blankets and by turning up heating – although the cost of this was also cited as a concern. However, regarding extremes, it was noted particularly that many people travel to the town from surrounding areas (either rural areas or nearby towns) via car. Certain main roads in and out of the town were reported to be kept well clear during snowy conditions, however surface water flooding and bad ice were reported as issues even on major roads. On smaller rural roads, heavy snowfall was reported to be a major barrier. These kinds of extremes are notable as they provide a hard barrier that prevents certain behaviours or services, for example travelling along a road buy food or to provide home care. Although people could 'get on with it' during extreme heat if they had to, once a road is impassable with snow, there is little that can be done until it melts or is cleared. In one of the care home settings spoken to, on days of heavy snow a significant proportion of staff (approx. 1 in 6) may be unable to make it to work. It is important to consider how these hard barriers might change in the future in Castlederg and elsewhere in Northern Ireland.

Other impacts from cold and wet weather extremes ranged from costs associated with cleaning up mess and damage to facilities such as generators due to floods, falls and breaks, loss of garden shrubs, burst pipes and boiler issues and high heating bills due to cold.

These attitudes broadly mirror wider attitudes in Northern Ireland regarding the serious nature of different extreme weather events. In the RESIL-RISK NI survey (5), out of ten types of extreme weather events, heatwaves ranked 5/10 and hot summers ranked even lower in both populations surveyed, with levels of agreement that these hazards are a fairly or very serious concern ranging 42-62 % across both populations. By contrast, flooding and heavy storms ranked first



or second depending on population, with agreements that these hazards were fairly or very serious ranging 77-87 %.

While noting that cold and wet extremes can cause serious disruption for local residents and workers, the emphasis of the remainder of this report will be on heat extremes as these sorts of temperatures are only likely to become more commonplace over wider parts of Northern Ireland.

Impacts on care

A range of care facilities in Castlederg were visited or contacted via telephone, with semi-structured interviews carried out with managers/co-ordinators, and an informal discussion held with some residents. This included independent sheltered accommodation, a supported living and nursing unit and a residential home and sub-acute hospital, each of which had slightly different management approaches to deal with the heat. Generally, there may be up to 3-4 days per week during the summer which could be classed as 'hot days' in which some additional precautions are taken. Here, impacts and adaptation for staff and residents are discussed.

It was noted that for staff, care work can be physically intense with long shifts of up to 12 hours, which can be difficult in hot conditions. Particularly for those working night shifts, trying to sleep during the peak temperatures of the day could be difficult. In the independent care settings, the heat could be "uncomfortable" but manageable, whereas in larger homes where indoor temperatures are centrally controlled it can be hotter and more difficult. For residential and more complex care settings, particularly where PPE (personal protective equipment) had to be worn to prevent the spread of COVID-19, heat was noted to be a particular issue, leading to dehydration, discomfort and fatigue. As well as temperature, the humidity was also noted as being important for staff discomfort. Alternative lighter uniforms are available, staff are encouraged to drink regularly from water coolers, take regular breaks and to eat lunches outside and spend time with their PPE masks off. It is important to note that not all staff will experience the heat in the same way, with certain settings such as the laundry and kitchens being particularly hot.

For residents, high temperatures can be "very, very difficult", particularly those who find it difficult to drink enough fluids to begin with. Homes monitor the intake of fluids for each resident and offer ice lollies in very hot conditions. Control of the indoor temperature depended on the setting. There was no explicit guidance for those in independent living and it was up to the residents to decide. (All of those spoken to on 21st July 2022 had said their heating was off and had been off during the ongoing warm period.) In the other care spaces, the temperatures are monitored and managed, for example individuals' rooms have target temperatures of 18-21 °C while other communal spaces may range 23-25 °C on hot days. Residents typically prefer warmer temperatures than staff. Ventilation to cool rooms could prove a challenge: sometimes fans are not allowed in communal spaces to prevent spread of COVID-19, open windows can allow flies in and can cause draughts which some residents find uncomfortable. In other cases, some windows cannot open or have only a



limited amount of opening when it would be helpful to open them further. Although glass makes the indoor spaces nice and bright for residents, it poses a challenge when it is hot and sunny. One home only had very limited air conditioning in a treatment room and a store, installed in response to recent higher temperatures.

There was reported to be some external and institutional support within the care sector. For example, the Public Health Agency would reach out to care homes during hot and cold spells and offer advice on managing the heat in terms of staff and resident support. The Department of Health also made contact with homes with advice and information on dehydration. Together, this advice sounds similar to what is communicated in England by the UK Health Security Agency as part of their Heatwave Plan for England (6).

There were some areas of concern, however, including a lack of appreciation of how extreme temperatures can be in Castlederg, compared to the rest of Northern Ireland or even nearby areas. As noted by one interviewee: "Our head office is in Londonderry, they didn't send assistance until we said 'it is really bad down here', and they are only up the road." Additionally, with regards other impacts caused by cold and flooding, limited institutional support for private businesses was noted, for example from Department of Infrastructure in response to flooding.

Care for younger people was also considered, with a day care for pre-school age children, an Education Authority run summer scheme and a teacher at secondary school all contacted. Young people aged under 5 are known to be particularly vulnerable to high heat (Heatwave Plan for England). For older children, the hottest days of the year generally will fall out of school term time, however hot weather in May, June and September is possible, and summer schemes may run throughout July and August, so care for this age group is also worth consideration.

For the pre-school age children, it was noted "The children would be more irritable, more tired" and some children do not like having sun cream applied – which can result in things being "heated". During hot weather, staff communicate with parents to send children with as light clothing as possible, hats and with sun cream already applied, and parents are usually good at following this guidance. In the building, blinds are used and do make a difference, but they are not available in every room. For ventilation, some windows can be opened and fans are also used; there is no air conditioning. There is a schedule for each day, usually going outside twice a day. However, in hot weather this is flexible and staff keep children indoors or outdoors for longer, depending on which is cooler. Water play is an option to help deal with the heat.

For staff, the heat "does make it uncomfortable, more stressful and harder work". However, working with children is very intense with little time to pause to take a rest (typical working days are 8.5 hours). Prolonged hot conditions can therefore lead to some fatigue. In hot weather, staff are also able to wear shorts. Cold conditions were not reported to be a major concern, with heating



generally adequate to keep the building comfortable, however the business interviewed started since the exceptional cold of 2010.

For the older age group (aged 9-12) at the summer school, activities at the summer scheme were adjusted during the hot weather on 18th July 2022 to be either inside or less physically intense. With summer schemes, there may be more flexibility in this regard than with a conventional school or classroom setting. In the secondary school, recent major heatwaves fell outside of the school term, however some days in May and June can get hot and longer events are more challenging. The children were noted to be livelier when it is hot and sunny. Little of the building is air conditioned, relying on opening windows and shutting blinds to regulate the temperature. Flexibility is again important: some uniform regulations may be relaxed and, where field-based teaching may be possible (e.g. science and geography), some classes may be held outside. Parents are advised to send children to school having applied sun cream via the school app. There is some monitoring of temperature and CO₂ levels in science labs, which could potentially be used to feed into future heat management decisions. In cold conditions, snow and ice again can be an issue for travel and school jumpers are permitted to be worn in the winter months. There is no obvious impact on learning when it is cold.

Conclusions and recommendations

Castlederg has a unique climate within Northern Ireland. However, the temperature extremes experienced in the town in 2021 and 2022 are only likely to become more common and more extreme in future, and the majority of Northern Ireland can expect comparable temperatures if global temperatures continue to warm (see figure).





Typical high summer temperatures during the past 30 years (left) and under a global warming scenario of 3 °C above pre-industrial levels (right). The temperatures recently experienced in Castlederg (light purple colour) will be expereienced and exceeded across most of the country in the future. Maps from <u>https://akaresearch.shinyapps.io/ruralheat/</u>.

The impacts of high temperatures generally do not yet cause clearly visible disruption or hard barriers to normal life, in the way that flooding or heavy snowfall do and as a result are both major concerns to people of Castlederg. However, the 2022 summer heatwaves in England have shown that visible and disruptive impacts of heat are possible, including wildfires, melting road surfaces and power outages.

Local residents were generally aware of good practice with how to manage the heat, including ventilating buildings when it was cool outside, closing blinds during the day and staying hydrated. However, within the care sector there was broad agreement that such high temperatures can pose a challenge to staff and residents. Similar challenges have been noted elsewhere in the UK (7).

Based on a series of interviews with care providers and residents, along with observations from the author's own research background, the following seven recommendations are made:

For residents and care providers in Castlederg:

- Reducing sunshine entering a building in hot weather is one of the most effective ways to keep it cool. Installing external shutters on south facing windows would be the quickest way to do this – this was not seen on any of the buildings visited. Planting trees on the south side of buildings may also be an option and trees will also help shade and cool the ground outside.
- In experimental conditions, warm temperature is often perceived and reported as 'comfortable' by both older people and workers, when physiological observations show these temperatures are in fact having a negative impact on the subject's health. **Managers and care staff therefore need to remain alert to high temperatures, even if they become more commonplace in future years and residents report that they "don't mind"**.

For elsewhere in Northern Ireland:

- Resilience to weather extremes can be built through the strength of community. This was highlighted several times in Castlederg, particularly in relation to snow and flooding, with local residents helping provide food to care homes or clear roads and car parks of debris.
- Flexibility is important, either in terms of daily routine for those living independently, or in terms of planned activities for those in positions of care. For managers, flexibility with staff to take breaks and wear appropriate clothing, where possible, is encouraged.

"Monday was too hot to be out. ... For people who have retired, it doesn't matter really. Whatever comes along, you accept it." Sheltered accommodation resident

For research and policy communities:

 Research into the risks of wildfire and infrastructure damage (e.g. melting roads or power outages) is currently lacking for Northern Ireland and should be a future priority. Additionally, it is important for research to consider



long multi-day events, as these can be harder for people, including the elderly in care, to deal with.

- When considering the impact of heat on labour productivity, it is important to consider carers. They are not often classed as a sector involving 'physical labour' in the same way agriculture or construction is, when in fact the work can be physically intense, require PPE and involve long shifts.
- **Consider local place-based variability**: Castlederg is a unique and more extreme climate than the rest of Northern Ireland. General policies applied to the whole country may not appreciate the risk in specific locations such as Castlederg, resulting in an underestimation of risks and impacts.

Acknowledgements

We would like to thank the residents and care providers of Castlederg for being so generous with their time, without which this report would not have been possible.

References

- 1. BBC News NI, 2021: <u>https://www.bbc.co.uk/news/uk-northern-ireland-57242790</u>
- 2. Kendon, 2021: <u>https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/</u> <u>weather/learn-about/uk-past-</u> <u>events/interesting/2021/2021_04_july_northern_ireland_temperature.pdf</u>
- 3. Summer Heat and Agriculture NI app, 2022: https://akaresearch.shinyapps.io/climateni/
- 4. Belfast Telegraph, 2022: https://www.belfasttelegraph.co.uk/weather/northern-ireland-floodingnew-met-office-warning-as-fire-service-rescues-six-people-afterapocalyptic-downpour-41863184.html
- 5. Steenjes et al., 2022: <u>https://climatenorthernireland.org.uk/site/wp-content/uploads/2022/05/report-final-2.pdf</u>
- 6. Heatwave Plan for England, 2022: https://www.gov.uk/government/publications/heatwave-plan-for-england
- 7. Gupta et al., 2021: https://journals.sagepub.com/doi/full/10.1177/01436244211013645

Further information

Author contact: alan.kennedy@bristol.ac.uk



UK CLIMATE RESILIENCE PROGRAMME This work was funded by the UK Climate Resilience Programme as part of the *Once Upon a Time in Heatwave* project (NE/W00707X/1)

Published 31/10/22