

# Understanding the social factors influencing resilience to drought exposure in Scotland

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Climate change poses an increasing risk of drought hazards in Scotland, with those on Private Water Supply (PWS) particularly exposed to water scarcity. This CREW Policy Note examines the international literature on the social conditions that influence resilience to drought exposure. It aligns these to three areas of communication to better target drought forecasting, drought preparedness and drought response.

## HOW ARE DROUGHT HAZARDS AFFECTING SCOTLAND?

Drought hazards (Box 1)<sup>1-3</sup> are increasing under climate change in Scotland. Scotland experienced water scarcity in 2018, 2020 and 2021. Research has shown that the River Tay and the River Spey could see a two- or three-fold increase in drought under climate change<sup>4</sup>. Exposure will vary between urban and rural areas in Scotland, particularly as 3% of the population are relying on Private Water Supplies (PWS) often in very remote parts of the country<sup>5</sup>. Scotland's first [National Water Scarcity Plan](#) was released in 2015. This plan focuses on how regulators will work with licensed water users and key organisations to manage resources before and during prolonged dry weather, and what action is required during periods of water scarcity. However, at present there is no policy document that explores the social impacts around drought exposure.

There is a need for greater awareness that drought and water scarcity is an issue in Scotland under climate change. Policy should target communication around improving people's resilience to water scarcity. As well as varying hazard exposure between urban and rural areas, social circumstances also vary.

## Overview

- Climate change poses an increasing risk of drought hazards in Scotland, with people on Private Water Supply (PWS) particularly exposed to water scarcity.
- Underlying social circumstances need to be acknowledged in drought management and resilience policy.
- These can help tailor communication for those on PWS to enable people to become more resilient to drought exposure.
- Public perception is important for drought preparedness and response. A key challenge for Scotland is the national messaging around climate change impacts to water resources, and future increasing water scarcity.

Research has shown that rural communities tend to have stronger social connections compared to more urban communities<sup>6</sup>. Additionally, social capital is important for resilience to environmental hazards<sup>7</sup>. For that, it is important to acknowledge the underlying social circumstances that create vulnerability and how this influences resilience (Box 1). Doing so enables policy changes that can target communication strategically to reach a diverse audience, with the purpose of increasing resilience.

### Box 1: Definitions

Defining determinants of risk<sup>3</sup>:

- **Hazards** are "the possible future occurrence of natural or human-induced physical events that may have adverse effects on vulnerable and exposed elements."
- **Exposure** is "the inventory of elements in an area in which hazard events may occur."
- **Vulnerability** is "the propensity of exposed elements such as human beings, their livelihoods, and assets to suffer adverse effects when impacted by hazard events."
- **Risk** is "the possibility of adverse effects in the future" (p.69).

Difference between disaster risk reduction and resilience<sup>2</sup>:

- **Disaster risk reduction** deals with the identification of hazards, analysis of hazard impacts and causes, and the removal or reduction of vulnerabilities."
- "**Resilience** deals with the transformation of people's capacity to cope, overcome, and recover from disaster effects" (p.23).

Difference between drought and water scarcity<sup>1</sup>:

- "A **drought** is an extreme event brought about by a lack of rainfall and may be made worse by high temperatures. It is a natural phenomenon exacerbated by climate change."
- "**Water scarcity** is the lack of sufficient available water to meet the demands of water usage. Water scarcity may be made worse by drought but can be minimised by wise water management." (p.6)

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This CREW policy note summarises the evidence from a comprehensive systematic international literature review on the personal, social, environmental and institutional conversion factors (**Box 2**) that interact to either enhance or restrict resilience in a drought context. These results from an international context were presented to stakeholders to discuss what might help communication around drought forecasting, preparedness, and response to improve resilience for people (private users) in Scotland on PWS.

## Box 2: Acknowledging different social circumstances through conversion factors

*Different factors can either enable or limit the way in which a drought hazard is converted into impacts on well-being:*

- **Personal conversion factors** are individual characteristics that can make people more or less susceptible to the impact of droughts
- **Social conversion factors** relate to the social context that influence people's adaptive capacity when preparing for or responding to droughts
- **Environmental conversion factors** relate to the nature of the hazard, as well as the environmental setting which can enhance exposure to droughts
- **Institutional conversion factors** relate to the institutional and policy context which can impact the response to drought.

Based on work from Lindley et al. (2011).

## WHAT ARE THE SOCIAL CIRCUMSTANCES THAT INFLUENCE VULNERABILITY?

Exposure to the same hazard can result in different outcomes for people based on personal, environmental, social, and institutional conversion factors (**Box 2**). Pre-existing inequalities are often not hazard-specific but can be made worse because of the hazard<sup>8</sup>. This policy note and accompanying systematic literature review applied the framework developed in Lindley et al. 2011 to identify conversion factors that influence people's exposure, sensitivity and adaptive capacity to drought which contribute to vulnerability – all of which influence a person's resilience. These conversion factors were then used to understand how communication needs to be tailored in Scotland to account for different levels of vulnerability.

**Personal factors** included age, health, and income.

**Environmental factors** included the slow onset of drought, changes to land use, and rural or urban contexts.

**Social factors** included social capital– particularly community engagement, networks, and trust– ownership of land and diversification of livelihoods.

**Institutional factors** included early warning systems, bottom-up and top-down knowledge integration, access to information, and public and institutional training.

## WHAT FACTORS CAN BE TARGETED TO IMPROVE COMMUNICATION TO ENABLE RESILIENCE?

The interaction of these personal, social, environmental and institutional conversion factors influenced people's perception around drought preparedness and response. Policy can target these factors, to help people be resilient to drought.

## DROUGHT FORECASTING

Early warning systems are identified as an important resource for resilience. Conversion factors that allow people to turn the information into practical improvements for resilience from the literature include:

- Ability to understand weather and/or drought forecasts<sup>9</sup>
- Access to information<sup>10</sup>
- The timing of the forecast<sup>9</sup>
- The perceived accuracy of information<sup>9</sup>
- Translation of information into adaptation strategies<sup>9</sup>

These conversion factors are relevant in a Scottish context. SEPA translates the weather forecast and monitoring data into a [weekly water scarcity report](#) for the water environment to provide information to operators as well as the public. The forecast is simplified into plain language to ensure it can be understood and is given a drought indicator (Normal conditions, Early warning, Alert, Moderate Scarcity, Significant Scarcity). Further information on how to look after PWS is provided through a [Scottish Government website link](#). However, it requires input from local authorities and their 'on the ground' experiences of water scarcity. It is important for policy to acknowledge inequality in access to drought forecasting information. Some people on PWS might not have internet access or be part of a community group that receives water scarcity information.

Droughts are a slow onset hazard which provide a longer lead time for early warnings to increase public awareness<sup>11</sup>. However, Scotland is perceived as a wet country. This creates complications around the timing of the drought forecast warnings if it coincides with several flood or storm warnings. This can feed into the perceived accuracy of the drought forecasting report. Policy needs to recognise the challenges around public perception to drought as a hazard in Scotland.

A recent report on communicating flood risk in Scotland highlights that communication is only useful if people know what to do with that information<sup>12</sup>. This applies across many contexts and is equally relevant in a drought context. Policy changes can improve

communication around drought preparedness to translate the early warning information into adaptation strategies.

## DROUGHT PREPAREDNESS

Drought forecasting can help improve resilience to drought only if people know how to turn the forecast into resilience. Social capital and access to information are identified as important resources for drought preparedness. Conversion factors from the literature around social capital and information as practical improvements for resilience include:

- Reducing uncertainty around what to prepare for<sup>9</sup>
- Education on risk<sup>13</sup>
- Integrating bottom-up and top-down knowledge<sup>14</sup>
- Access to funding opportunities for water supply maintenance or adaptation strategies<sup>14</sup>

A key challenge for Scotland is the national messaging around how climate change is likely to increase drought exposure and water scarcity in the future. People's actions to prepare for drought will differ between those on PWS and those on a public supply. Even within PWS groups there are a lot of different variables – both socially and geographically – which can make the communication on preparedness more complex. National messaging needs tailored for different local authorities, then tailored for different communities.

There is a need to communicate increasing drought exposure in Scotland but also action communities can take to be better prepared for droughts and water scarcity. An example of integrating top-down and bottom-up knowledge on drought preparedness is the [Local Authority Waters Programme](#) in Ireland. It is a national shared service working on behalf of 31 local authorities in Ireland to collaborate with local authorities, state agencies, public bodies, private sector stakeholders and local communities. It emphasises the importance of community engagement to combine local and expert knowledge for a better understanding of what is happening in a local catchment and waterbody. Their use of community water officers offer support with PWS, flooding, drought, and resilience, and can direct communities on where to find funding for resilience support. Whilst local authorities already provide advice and support in Scotland, the role of a dedicated community water officer could help to improve drought preparedness.

## DROUGHT RESPONSE

The literature highlighted that urban and rural perspectives and experiences have an influence on drought perception and subsequently on drought response. The conversion factors from the literature around drought response to improve resilience include:

- Experience with drought or water scarcity<sup>15</sup>
- Public perception to drought<sup>16</sup>
- Policy response to drought<sup>17</sup>
- Stakeholder engagement with communities<sup>17</sup>

Drought response policies supported by urban and rural communities are likely to be different because of different experiences of water scarcity and connections to the land<sup>15</sup>.

A key finding in the literature was on supply vs demand policy responses and the feedback this has on public perceptions.

The review found that policies which focus on managing drought supply may reduce public perceptions that water scarcity may be a concern in the future and encourage lifestyle changes that are more water intensive<sup>15</sup>. Those which focused on demand reduction policies had perceptions around equity and efficiency concerns<sup>18</sup>.

In Scotland, people on PWS do not necessarily require information on when to start reducing their water use as they are aware of their source of water and when it is becoming low. They need support on what action to take to be resilient<sup>5</sup>. People on public water supply are ensured supply of water and are less likely to be aware of increasing water scarcity issues for those on PWS. This requires different communication around water efficiency. Therefore, greater responsiveness to water availability should be encouraged in urban areas<sup>15</sup>.

Action plans can help people know what to do in response to a drought warning. Both formal and informal volunteer groups can improve drought response. In Scotland, people in accessible and remote rural areas are more likely to have stronger social participation, community cohesion as well as stronger social networks than the Scottish average<sup>6</sup>. This indicates that there are already potential routes in which community groups can be established. Community resilience groups could be supported with action plans, similar to those constructed in response to increasing flood risk with the support of the Scottish Flood Forum.

In the literature, higher community engagement was associated with stronger support for drought response policy<sup>15</sup>. In Scotland, the role of a community water officer could act as a point of contact between communities and organisations to report information on drought response. This can provide an iterative process to inform future top-down and bottom-up information on drought forecasting, preparedness and response.

## WHAT ARE THE POLICY RECOMMENDATIONS?

Policy recommendations are around tailored drought communication in Scotland:

- An integrated database of PWS that can be accessed by all stakeholders to allow a more targeted approach to drought preparedness and response.
- There is a need to understand the linkages between land-use planning and drought planning policy, and where these policies can ensure longer-term resilience to drought. The integrated database could help inform this.
- An improved early drought warning system which is informed by the integrated database as well as bottom-up knowledge.
- Tailored support about adaptation and resilience beyond what is currently offered by local authorities for those on PWS. There is a need to better understand the nature of households that are served by PWS to target support. A potential avenue could be a dedicated community water officer to liaise with communities and stakeholders to advise them on how to make their supplies more resilient.

- Support for both formal and informal resilience groups to create local action plans for those on PWS, including where to get information on how to be more resilient.
- Those on public supplies need more awareness on drought and water scarcity as an issue in Scotland in the context of climate change.
- A potential avenue for raising awareness of water efficiency could be through tourism campaigns that raise awareness of water scarcity and asks visitors to use water wisely.

In conclusion, improving communication around drought forecasting, preparedness and drought response can help target conversion factors to enable people to be more resilient to drought exposure.

## FUTURE RESEARCH PERSPECTIVES

The systematic review of international literature summarised here has highlighted the conversion factors in communication policy which can be targeted to improve drought resilience. Future research areas include combined mapping of PWS, areas of social disadvantage, and climate change projections for drought hazards. Qualitative research is also required to understand baseline perceptions around drought and water scarcity in Scotland. Future research could explore water consumption and water efficiency behaviour in the context of climate change for Scotland. This will help inform communication strategies and resilience support as policy moves towards a more proactive response to water scarcity and drought. Research is also required on multi-hazards in Scotland and their implications for resilience policy and drought communication. The future research suggested would support the potential options being explored by SEPA for a drought warning system that the public can sign up to.

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