CREW CENTRE OF EXPERTISE FOR WATERS

Future predictions of water scarcity in Scotland: impact on distilleries and agricultural abstractors

Policy Brief

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Recommendations

1. **There is a need for a cross-sector process of preparing for a future of water extremes,** as also found by Gosling *et. al.* (2024). We need to move from reaction to adaptation – however transformation of the system is not yet visible.
2. **Better data on abstraction volumes is needed** (including estimates of those using surface and groundwater under general binding rules) and could be integrated with farm census data to identify areas where both water demand, and vulnerability to water deficit are high. An online water calculator could then be developed to enable farmers and distillers estimate their exposure to future water scarcity, increase the demand for water scarcity adaptation advice and help make strategic adaptation decisions.
3. **There is an urgent need for enhanced groundwater monitoring across Scotland.** The National Water Scarcity Plan highlights the potential for groundwater to provide more drought-resilient water supplies in response to future water scarcity. However, the lack of information regarding the status of these resources at a catchment scale needs to be addressed to understand where, when and to what extent groundwater is a viable substitute in the long term. A cost-benefit analysis of exploiting deeper groundwater, or the potential for augmenting recharge through, for example, nature-based solutions such as managed aquifer recharge need to be explored.
4. **Embedding a culture of checking water resource projections (using SEPA's Water Situation Reports) as part of business planning will help with proactive adaptation**. To improve local understanding of conditions for the onset of significant drought, spatial resolution of drought risk assessment could be refined. Focus group participants reported that on occasion, whilst river flows may be above severe drought levels, water resources in upstream locations were already in drought. Therefore, other metrics and data sources, additional to SEPA gauging stations, should be explored, including the use of remote sensing data.
5. **A clear pathway to options that can be implemented by a variety of businesses** is needed to promote water scarcity in terms of business resilience to risks. Awareness raising is needed for solutions to illustrate potential returns on investment and how they can fit with rotations and existing farm practices. Clarity on funding opportunities for these interventions in the new Agricultural Payments Tiers would be welcome.
6. **Collective action responses can help mitigate scarcity.** The work of catchment management partnerships that can provide a coordination mechanism, act as a trusted intermediary and reduce the need for busy farmers or distillery managers to undertake relationship building and maintenance activities needs more visibility and support to co-ordinate water resources use at landscape/catchment level.
7. **The costs of adaptation strategies should be compared to potential costs of water scarcity** to the sectors at the individual business level and at the national scale when assessing (i) abstraction restriction requirements and (ii) potential interventions to support adaptation of the sector to future climate conditions.

Summary

- A five-month research project was undertaken to see what was known about water scarcity in Scotland and how it would affect the livestock, crop and distillery sectors.
- There is a clear direction of travel understandable to focus group participants in terms of more frequent water scarcity, with knock-on effects in terms of costs for those who are in water stressed areas.
- There is less consensus on how to respond to scarcity, with cost of efficiency and substitution measures being cited as major barriers to uptake.

Research Undertaken

- Initial scoping online focus group and interviews with industry stakeholders and screening farm type data to prioritise our sampling for focus groups.
- A rapid scoping and evidence review to inform interactions between drought, water shortages, scarcity and the distilling, livestock and crop sectors.
- New analysis of the impact of future climate change on surface water drought frequency and duration using SEPA abstraction returns, followed by scenario modelling of the impact of future abstractions on surface water drought events.
- New water security framework for groundwater availability developed.
- Three focus groups with livestock farmers (national), mixed farmers (North-East), and arable/horticultural farmers (Fife) (total number of participants = 33) and one focus group with distillers from the Speyside region (total number = 26).
- Focus groups held to raise awareness of water scarcity predictions for Scotland, understand how those working in and with agriculture and distilling in Scotland are currently adapting to water scarcity or will adapt in the future, and to refine the conceptual models being built from the evidence review.

Key findings

- Observed shifts from climatic water surpluses to water deficits in late summer and early autumn for the 2020 – 2049 period are the main drivers of the exposure of most land cover types to climatic stress, depending on their spatial distribution in relation to west vs east geographical gradient. For cultivated land, arable land, mostly located in the eastern part of Scotland, and to a lesser extent improved grassland, were most exposed to climatic water stress.
- Due to geographical co-occurrence, the impacts on agricultural abstractions were similar to those seen for arable land, although a greater proportion of agricultural abstractions fell into areas under future climatic water deficit in April and September than was the case for arable land alone.
- Based on observed data for the recent 1990–2019 period, 20% and 88% of distillery abstractions were in water deficit in March and August, respectively, while almost all distillery abstractions were in continuous water stress between April to July. For the 2020–2049 period, these statistics ranged from no change to almost universal water surplus in March and 95% deficit in August, depending on the specific climate model scenario. Up to 85% of distillery abstractions could be in water deficit in September in the dry future scenario.
- By the middle of the century, mean surface water drought frequency and duration may nearly double, as compared to the baseline (2007–2018) period, from 0.33 to 0.65 events and 31 to 51 days, across 23 study catchments included in this study.
- In the east of Scotland, where long-term average potential recharge is relatively low, abstractions from high-storage sedimentary aquifers will be more secure through drought periods, while abstractions from lower-storage crystalline aquifers and localised superficial aquifers will be more vulnerable to drought. Projected increases in the frequency and intensity of droughts may decrease the future resilience of groundwater abstractions and further work is needed to understand the likely response of Scotland's aquifers to drought at a catchment scale.

- Focus group participants were aware of the risks of water scarcity and were feeling the impacts in terms of affecting yields, herd productivity, and increased input costs for farmers; also by constraining production and increasing energy and capital investment costs for distilleries.
- Focus group participants are adapting to water scarcity, but most farmers are taking more short-term reactive measures and avoiding investment in new sources, instead looking to Scottish Water to invest in increased public water resilience. Distilleries are investing in technical solutions to reduce cooling water requirements, but these can be energy intensive.

Conclusions

- Better data on abstraction volumes, groundwater levels, and water use by different sectors is needed.
- Sectoral water users engaged in the study were fully aware of likely future impacts, they now need the right frameworks to support adaptation responses.
- The agricultural sector sees both opportunities and challenges in future climate changes. However, negatives are likely to outweigh positives, especially due to the increase in climatic extremes and reduced weather predictability.

References

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