



Future climate risks from compound events

Why this is important: Compound events happen when two or more weather or climate hazards occur simultaneously or in close succession, potentially causing greater impacts than when the hazards occur alone. There is a strong need for better and more usable translation of hazard information into risks. This requires combining the hazard with vulnerability and exposure information to produce risk estimates. This will provide policy makers with more useable information for adaptation planning in different sectors to support increased resilience of the UK to future climate variability and change.



What the UKCR programme is doing: Work has used a case study approach to assess the current and future likelihood of several hazard events of interest to the UK agricultural sector occurring simultaneously or in close succession (compound events), and projections of risk associated with them. These include the risk from thermal heat stress in dairy cattle during warm and humid weather, and potato blight, a fungal disease that affects potatoes in warm humid weather. Future 12 km UK climate projections were used to consider if these examples of compound events are likely to be more frequent in the future climate (50 years' time) compared to the present day. Hazard frequency information has been combined with regional dairy cattle/potato numbers to present risk maps across the UK to aid decision makers in future agricultural planning. The study also considered adjacent UK seasonal changes, such as a cold spring followed by a warm/dry summer which can result in negative impacts such as reduced crop yields and cattle feed shortages. The research can be used by the agricultural sector to inform adaptation to climate variability and change.



Results so far: Results show that events of longer duration of potato blight are likely to emerge over the next 50 years, in addition to increased event frequency. Regions where most potatoes are grown and where the potato blight risk is greatest in both the current and future climate include the east of England, Yorkshire and the Humber and Eastern Scotland. Risk in some areas (East of England, the Midlands and Yorkshire and the Humber) will increase by over 20 %, with risk in East Scotland projected to increase by 67 %. The area of greatest risk for mild thermal heat stress in dairy cattle now and in the future is the South West, where the number of days per year exceeding the threshold for mild heat stress may increase by a factor of 10, a percentage risk increase of nearly 1000 %. Other key areas of high future risk and large risk increases include Northern Ireland, Wales, the Midlands, North West England and North West Scotland. Longer duration events are expected to become more frequent.

Finally, we consider projected changes to UK seasons, using 2018 as a template, where a cold spring followed by a warm/dry summer resulted in hay/silage shortages. In addition to reduced crop yields in 2018, cattle were kept inside for longer in the cold spring and in the warm/dry summer, due to heat stress and poor grass quality. The probabilities of cold spring/warm summer conditions in the same year will decrease in future, but the probabilities of longer dry/warm summers will increase. These results indicate that the agricultural sector should consider suitable climate adaptation measures to minimise the risk of dairy cattle thermal heat stress, increased potato blight, and longer dry/warm summer conditions.

What is next? These results have been published in the Special Issue on “UK Climate Risk Assessment and Management” in the journal *Climate Risk Management*. Results were also presented via a webinar and Q&A session at the Agronomist Conference in December 2020 which was attended by UK advisors on potatoes and supermarket representatives. The methodologies and results have been shared with the UK and international scientific community through various webinars and conferences.

Reference: Garry, F., Bernie, D., Davie, J., Pope, E. 2021 Future climate risks to UK agriculture from compound events, *Climate Risk Management* for inclusion in Special Issue on “UK Climate Risk Assessment and Management”

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