

Risk of Drought-Related “Fodder Crises” in Irish Agriculture under mid-21st Century Climatic Conditions

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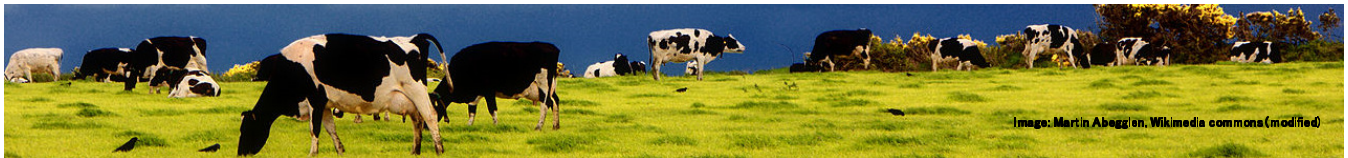


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Background

Acute shortages in fodder supplies may develop into so-called ‘fodder crises’. In recent years several fodder crises have emerged and have had significant impacts on agricultural production, and farm revenues. These fodder deficits are multifactorial in nature and are driven by meteorological and management factors.

Research Question

The **ClimAg** project seeks to identify these multifactorial drivers by: (1) analysing and profiling past fodder crisis events; (2) building an inventory of fodder crises, and (3) combining datasets from 21st century climate simulations with grass-growth models to predict the frequency and severity of fodder crisis events under future climate change scenarios

ClimAg Fodder Crisis Event Inventory

Event descriptions are structured under: Introduction, Antecedent Conditions, Meteorological Conditions & General Impacts

Year	Severity	Duration	Location	Economic	Animal
1947	High	Annual	Widespread	Appreciable	Famine
1950	Low	Seasonal	National	Limited	Hunger
1955	Low	Multiannual	National*	Limited	Hunger
1956	Low	Multiannual	National*	Limited	Hunger
1958	Low	Seasonal	Regional	Limited	Hunger
1962-63	Moderate	Multiannual	Widespread	Appreciable	Hunger
1974	Moderate	Annual	Widespread	Limited	Acute Hunger
1976	Moderate	Seasonal	Widespread	Limited	Acute Hunger
1985-86	High	Multiannual	National	Limited	Starvation
1995	Low	Seasonal	Regional	Limited	Hunger
1998	Low	Multiannual	Regional	Limited	Hunger
1999	Low	Multiannual	National	Limited	Hunger
2001	Low	Multiannual	Regional	Limited	Hunger
2002	Low	Multiannual	Regional	Limited	Hunger
2007	Low	Seasonal	Regional	Limited	Hunger
2009	Low	Seasonal	Regional	Limited	Hunger
2012-13	Extreme	Multiannual	National	Considerable	Starvation
2018	High	Annual	Widespread	Appreciable	Acute Hunger
2020	Moderate	Unknown	Regional	Appreciable	Hunger

Data & Methods

Climate change data were obtained from KNMI’s Climate Explorer service. Monthly precipitation for southeast Ireland (land area between 52.5 – 53.0 °N, 6.5–7.0° E) was extracted from the NorESM1–M RCP8.5 run of the CMIP5 model family. Ensemble means were used to compare the occurrence of the low May–June–July rainfall conditions which contributed to the 2018 event under past (1981–2010) and mid-21st century (2041–2070) climate scenarios (Fig. 3).

Event profile: 2018 fodder crisis

The fodder crisis of 2018 emerged in parallel with a prolonged and severe drought and resulted in acute shortages of fodder across most of the country, particularly in the south and southeast of the country (Fig. 1) During the 2018 event, warm air was advected around the southern side of a blocking anticyclone positioned over southern Scandinavia, leading to much warmer than average conditions, with significantly reduced rainfall totals. This pattern persisted between May and mid-July. At Enniscorthy a total of 89.3 mm was recorded during the months of May, June and July 2018 versus the 1981–2010 long-term average of 241.7 mm (Fig. 2). Significant soil moisture deficits developed by mid-June, with deficits in the southeast reaching over 95 mm in places.



Fig. 1. Emergency fodder transport, 2018 (image: Nolan Transport)

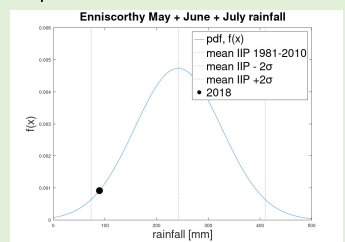


Fig. 2. May+June+July historic rainfall distribution (IIP, 1981–2010; Noone et al., 2016) and 2018 May+June+July rainfall

Fodder crises in the 21st century

Events similar to that of 2018 may increase in frequency and severity by the mid-21st century due to seasonal shifts in precipitation. Recent work by Nolan & Flanagan (2020) predicts more frequent summer heatwaves, particularly in the south of the country, increased occurrence of dry periods and heavy precipitation events, but also longer growing seasons.

Initial results from ClimAg (Fig. 3) show that distributions of 2041–2070 May–June–July rainfall under the RCP 8.5 scenario are lower than the 1981–2010 historic average, making 2018-like events more probable in this future climate.

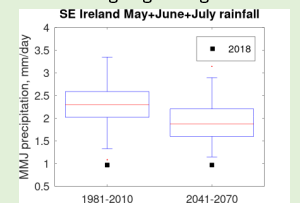


Fig. 3. Distributions of SE Ireland 1981–2010 and 2041–2070 May–June–July rainfall and 2018 event magnitude. Red = median; blue box = quartiles.

References

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