

research highlights

CUE-ENVIRONMENT MISMATCHES Colour compensation

Ecol. Lett. <http://doi.org/dwbz> (2020).



Credit: All Canada Photos / Alamy Stock Photo

To cope with seasonal variation, many organisms have evolved seasonal plasticity, which requires the ability to predict coming change using external cues. Photoperiod variation, which remains constant from year to year and is not influenced by short-term fluctuations, is one commonly used cue. However, anthropogenic climate change, including changes in temperature and seasonality, has resulted in mismatches between photoperiod and expected environmental conditions. It is unclear how well organisms can compensate for these novel mismatches.

Matthew Nielsen and Joel Kingsolver investigated hindwing melanization in the orange sulfur butterfly, *Colias eurytheme*. Melanization aids thermoregulation but is determined by larval photoperiod exposure as opposed to temperature. By repeating a study published in 1973, the authors found that

contemporary butterflies had higher-than-past wing reflectance when developed under short-, but not under long-, photoperiods. This aligns with the greater long-term change in spring than summer temperature at the collection site. The work provides evidence for cue-environment mismatch correction but suggests that it may not occur uniformly under all conditions. **TAM**

<https://doi.org/10.1038/s41558-020-0811-3>

EMERGING ECONOMIES Emissions trading

Clim. Policy <http://doi.org/dwb3> (2020).

Domestic climate policies to reduce CO₂ emissions need to be cost-effective to win public and political support. Emissions trading schemes (ETS) are a market-based approach that put a limit and a price on units of emissions. But the success of such schemes has been varied.

To determine what factors make for successful ETS, Peter Howie of Nazarbayev University, Kazakhstan, and colleagues use a policy success typology to analyse the ETS of Kazakhstan and Korea. The Korean scheme, launched in 2015, is now the third-largest carbon market in the world and covers ~70% of domestic emissions. While the Kazakhstan scheme launched in 2013, it was temporarily suspended to resolve operational issues in 2016–2017.

The authors find that stakeholder consultation from the design through to implementation phase, as well as capacity building — within both the public and private sectors — at an early stage are

necessary for success in these emerging markets. Additionally, introduction of policies that complement the ETS are needed to overcome consumer resistance to energy price increases and support firms during low revenue periods. **BW**

<https://doi.org/10.1038/s41558-020-0812-2>

WARMING TRENDS Dry heat

J. Geophys. Res. Atmos. **125**, e2019JD031792 (2020).



Credit: Xinzhen / Moment / Getty

The impact of enhanced greenhouse warming on temperature trends depends on factors like season, region, time of day and local climate. In addition, whether it's rainy or dry on a given day could matter, though this sensitivity has not been closely examined.

To explore this, Muye Du and co-authors working in China and Germany analysed data from 455 meteorological stations across China during 1966–2017. They found non-rainy days were warmer, had a larger diurnal temperature range and exhibited greater warming compared to rainy days — accounting for 76–86% of increasing temperature trends. The researchers found that neither shortwave radiation (sunlight) nor evaporation (latent cooling) could explain the differences. Instead, the enhanced warming arose from a higher sensitivity of longwave radiation to greenhouse gases; with no clouds, downwelling longwave radiation increases disproportionately, warming the surface more efficiently on dry days. This mechanism is consistent with larger warming in arid regions globally, and it may help interpret regional warming patterns and the behaviour of future droughts and heatwaves. **BL**

<https://doi.org/10.1038/s41558-020-0810-4>

Tegan Armarego-Marriott, Alyssa Findlay, Baird Langenbrunner and Bronwyn Wake

AFRICAN DRYLANDS Drivers of adaptation

Climatic Change <http://doi.org/dwb6> (2020).

Eastern African drylands are one of the areas most affected by climate change, with consequences for the pastoralist communities that comprise the majority of people living on these lands. Adoption of agricultural adaptation strategies in this region is relatively low due to compounding influences, from poverty, insecurity and conflict; however, these communities do use practices such as livestock migration or irrigation to mitigate the impacts of climate change.

In order to determine the factors impacting adoption of different strategies by pastoralist communities, Teresiah Wairimu Ng'ang'a from the University of Nairobi and colleagues assess socio-economic drivers of adaptation in a Kenyan Masai community. They find heterogeneous impacts arising from different drivers that are context-specific. For example, government assistance led to the uptake of adaptation strategies such as irrigation, which were more technical, while the quality of land influenced uptake of strategies meant to improve crop yields or livestock. Overall, the findings indicate that improved access to information as well as support of household innovation would enhance pastoral communities' ability to adapt. **AF**

<https://doi.org/10.1038/s41558-020-0809-x>