ECOLOGICAL IMPACTS

Gut-wrenching heat

Nat. Ecol. Evol. **1,** 0161 (2017)

BEZNOSKA RADIM / ALAMY STOCK PHOTO

As organisms respond to climatic changes in their own individual ways, interactions between species are likely to be altered and come under pressure. Species with strong obligatory relationships are likely to be particularly susceptible to such changes. The symbiotic relationship between animals and the bacterial communities in their guts presents one such system, but one that can be challenging to study.

Elvire Bestion from CNRS, Station d'Ecologie Théorique et Expérimentale, Moulis, France, and co-authors use an experimental warming approach to investigate the impact of temperature on the gut bacterial communities of the common lizard (*Zootoca Vivipara*). They find that 2–3 °C warmer climates cause a 34% loss of the populations' gut microbiota diversity.

The mechanisms driving this decline are not clear. Potential pathways include changes to the hosts' environment (for example, altered prey) or changes to the hosts themselves (for example, immunity). Irrespective of the pathway, higher gut bacterial diversity tends to be beneficial to hosts so climate-driven diversity reduction could turn out to be detrimental. *AB*

CLIMATE GOVERNANCE

EU emissions benefits

Environ. Res. Lett. **12,** 044009 (2017)

ANDREY KUZMIN / ALAMY STOCK PHOTO

With the dissolution of the Soviet Bloc, several nations in Eurasia and central and eastern Europe underwent radical changes in their economic structure, moving away from centrally planned to market economies. Additionally, some of them also experienced strong institutional changes due to entering the EU.

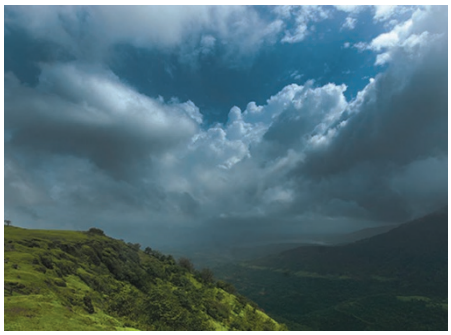
Andrew Jorgenson from Boston College, USA, and co-authors studied the influence of these transitions on the CO_2 emissions generated by the electricity production systems of 25 nations. Analysis of the emissions generated in 2009 by a sample of 1,360 fossil-fuel power plants indicates that the increase in international trade is associated with increased plant-level emissions. However, the decision to join the EU led to a far greater reduction in plant-level emissions, with a stronger effect for nations that entered early (like the Czech Republic, in 2004) compared to late-entering nations (like Romania, in 2007).

Harmonization with EU environmental directives was a long and costly process but it produced a considerable mitigation effect: all other things being equal, the new EU members had lower plant-level CO_2 emissions than their non-EU counterparts in the region. *MG*

CLIMATE DYNAMICS

Shorter monsoon season

Clim. Dyn. http://doi.org/b6zb (2017)



ELEREIN/MOMENT/GETTY IMAGES

The Indian summer monsoon (ISM) is characterized by extensive rainfall across the sub-continent, driven, in part, by land–sea temperature contrasts and the resulting landward flow of moist oceanic air. The ISM is a lifeline for more than one billion people, necessitating increased understanding of projections under anthropogenic climate change.

C. Thelliyil Sabeerali and Ajaya Ravindran from New York University Abu Dhabi, United Arab Emirates, examine how the length of the rainy summer monsoon season may change in the future. They use a subset of 12 CMIP5 coupled general circulation models, forced with the RCP8.5 emission scenario, that reasonably simulate the dynamic and thermodynamic properties that drive the ISM.

The authors reveal a reduction in the length of the ISM season by ~11 days, which, depending on changes in the rate of precipitation, will likely be accompanied by a concurrent decrease in the amount of rainfall. They attribute this change to rapid warming in the western Indian Ocean, which triggers deep convection, heat release in the upper atmosphere, and an associated weakening of the thermal gradient that drives the monsoonal circulation. However, continued development of model precipitation schemes is required to increase our confidence in monsoon projections. *GS*

CLIMATE CHANGE IMPACTS

Contemporary evolution

Philos. Trans. R. Soc. B **372,** 20160146 (2017)

Climate change and an increased frequency of extreme events is impacting, and will continue to impact, organisms. How organisms will cope is normally considered in terms of ecology due to the short or gradual nature of these stresses. Over longer timescales species can evolve to adapt to changing environments, however on shorter timescales evolution is rarely considered.

Now Peter Grant of Princeton University, USA, and co-authors consider contemporary evolution in the context of climate and extreme events. Whilst there are some examples of contemporary evolution discussed by the authors, evidence of such evolutionary response is limited due to a lack of genetic information. Extreme events put strong selection pressure on species, which can result in the alteration of communities and impact species interactions. These changes in community composition are likely triggers of evolution.

To gain understanding of species and population resilience in the face of on-going gradual climate change as well as episodic extreme events, the authors recommend consideration of both ecology and evolution in long-term field studies. *BW*

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