ADAPTATION

Air-conditioned health

PLoS Med. **15**, e1002599 (2018)

Credit: Kwanchai Lerttanapunyaporn/EyeEm/EyeEm/Getty

Adaptation to a warmer climate invariably includes the increased use of indoor air conditioning. This behaviour is not without potential consequences, although many of the impacts remain underexplored.

David Abel and colleagues from the University of Wisconsin-Madison, USA, assess the health impacts of increased air conditioning where the power sector remains carbon-intensive by linking multiple models to simulate interactions between future weather, building energy demand, power sector emissions and air quality for the eastern United States. Using meteorological conditions and electricity demand for July, they estimate that in a warmer climate, 3.8% of the overall increase in particulate matter and 6.7% of the total increase in ozone may be attributable to increased use of air conditioning. Consequently, 5–8% of air-pollution-related mortality, and comparable proportions of other health impacts, are similarly attributable.

The authors are clear that this is only one possible scenario of the future, and further work is needed. Nevertheless, the study serves as a warning that adaptive behaviour such as use of air conditioning, while necessary to manage human health impacts, can have substantial air pollution impacts if the power sector is not decarbonized. *AY*

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ECOLOGICAL IMPACTS

Bee-line for decline

Funct. Ecol. http://doi.org/cr2t (2018)

Insects are ectothermic (they regulate their body temperature using the environment), so many aspects of their biology and physiology are strongly influenced by environmental temperature. They are therefore expected to be sensitive to climate change — especially in warm environments where individuals are already functioning close to their thermal safety margins.

Paul J. CaraDonna, from the Chicago Botanic Garden, and co-authors investigate the effect of warming on a solitary bee species (*Osmia ribifloris* (Megachilidae)) in a warm, arid region of the southwestern United States. Their two-year field experiment uses nest boxes that were painted either white, to cool them, or black, to warm them to emulate past (around 1950) and future (2040–2099) temperatures from larval development to emergence.

Bees in the warmed treatment had delayed emergence phenology and a substantial increase in phenological variance. Higher temperatures also lead to reductions in body mass and fat content and 30–75% higher mortality. These findings suggest that *O. ribifloris* may face local extinction in the warmer parts of its range within this century. This case illustrates the potential risk of climate change to already-stressed pollination services. *AB*

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HYDROCLIMATE

Unprecedented Sahel drought

Clim. Dynam. http://doi.org/cr3n (2018)

Between the 1960s and 1980s severe drought plagued the Sahel, resulting in widespread famine and displacement. Although rainfall has subsequently increased in the region, it is not known whether this is a temporary recovery or part of a longer-term fluctuation. Using stable oxygen isotopes from archaeological shells in the Saloum Delta, Senegal, Matthieu Carré from the LOCEAN Laboratory, France, and colleagues provide a multi-centennial assessment of the Sahelian hydroclimate, placing contemporary changes in a longer-term perspective.

Precipitation is variable throughout the record, but an abrupt rainfall deficit began 200 years ago, and is shown to be unprecedented in the context of the past 1,600 years. Given the coincident timing with the onset of anthropogenic warming, it is suggested that contemporary Sahel drying may be related to human activities. As such, the apparent precipitation recovery observed over the past 15 years is likely to be related to short-term internal variability, implying that drought may become more commonplace in the near future. Further palaeoclimate reconstructions are required to help constrain precipitation projections in the Sahel, and thus minimize future socio-economic impacts through targeted adaptation and mitigation efforts. *GS*

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PHYSICAL OCEANOGRAPHY

Regional heat uptake

J. Clim. http://doi.org/cr3f (2018)

Credit: MichaelGrant/Alamy Stock Photo

Much of the global uptake of anthropogenic heat has occurred in the Southern Ocean. Upwelling of cold, deep waters to the surface allows the heat uptake, which is then transported northwards through the overturning circulation. Although this variability in regional heat uptake is known, changes with future warming are unclear.

To address this issue, Jia-Rui Shi and colleagues at the Scripps Institution of Oceanography, University of California San Diego, USA, use nine CMIP5 models to understand the role of GHG and aerosol concentrations on historical and future ocean heat uptake. They find that regional contributions change under a high-emissions scenario: heat uptake in the North Atlantic Ocean (north of 30° N) increases from 6% to 26% of the global total, while the Southern Ocean decreases from 72% to 48%. Although percentage values decline in the Southern Ocean, heat rate gains continue at their current rate.

The authors attribute this change in heat uptake patterns to a decrease in anthropogenic aerosols, which, in combination with increasing GHGs, weaken the overturning circulation and strengthen heat uptake in the North Atlantic. Thus, the North Atlantic is projected to become a major repository of anthropogenic heat alongside the Southern Ocean. *BW*

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