CLIMATE VULNERABILITY

Impacts on rural schooling

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Educational attainment can expand skills and labour opportunities, and is thus an important pathway out of poverty. However, school attendance in low-income countries is influenced by nutrition in early childhood and demands for child labour in agricultural activities. Thus, climate change may be a barrier to development to the extent that it influences agricultural productivity, particularly in sub-Saharan Africa where fluctuations in temperature and precipitation due to climate change are expected.

Heather Randell from the National Socio-Environmental Synthesis Center, USA, and her co-author examine how temperature and precipitation variability relative to historical norms during the first seven years of life influence schooling outcomes in rural Ethiopia. Analysis of data from the Ethiopian Rural Household Survey and high-resolution gridded climate data shows that experiencing summer drought and average spring and summer temperatures above a village's long-term mean reduces the odds of completing at least one grade of school. Because future climate change is expected to increase heat waves and precipitation variability during critical seasons for agriculture, policies like providing drought and heat-tolerant crops may help buffer against negative socioeconomic impacts of climate change in this region. *JR*

POLLUTION

CO_2 modifies nanoparticles

Sci. Total Environ. http://doi.org/bvjp (2016)

Up to 10,000 t of titanium dioxide nanoparticles ($nTiO_2$) — used in sunscreens, paints, plastics and cement, among other applications — are produced each year; a proportion of this is subsequently released into the environment. CO_2 can modify the behaviour of nanomaterials such as $nTiO_2$, so increasing the atmospheric CO_2 concentration may alter their environmental burden in the future when they are expected to be increasingly abundant in the environment.

Wenchao Du from Nanjing University, China, and co-authors investigate the effect of elevated atmospheric CO_2 on the toxicity of $nTiO_2$ to plants and soil microbes in a rice paddy experiment. They find that $nTiO_2$ does not affect rice plants at ambient CO_2 levels. However, under elevated CO_2 concentration $nTiO_2$ significantly reduces rice biomass (by 17.9%). In addition, elevated CO_2 enhances the accumulation of a number of heavy metals and reduced fat and total sugar in rice grains. These findings indicate that increasing atmospheric CO_2 may increase the toxicity of some nanoparticle contaminants, potentially reducing the nutritional quality of some crops. *AB*

BUSINESS AND ENVIRONMENT

Working less reduces emissions

Ecol. Econ. **132,** 124–134 (2017)

One way to control greenhouse gas emissions is to moderate the energy usage of factories and offices. A potentially simple way to do that is by reducing the number of working hours.

To investigate the efficacy of this strategy, Lewis King and Jeroen van den Bergh from the Universitat Autònoma de Barcelona, Spain, compare five scenarios that estimate the effect of a 20% reduction in working hours for full-time employees in the UK on greenhouse gas emissions. Two strategies emerge as the most efficient: a four-day workweek and a reduction in the number of employees working at the same time, both of which decrease energy consumption in the workplace. The results of these policies (for example, more leisure time and lower incomes) would change the greenhouse gas emission patterns and while these effects might partially cancel each other out (for example, people would consume less energy at work but more at home), the outcome is expected to be a net reduction of emissions. Interestingly, people have quite recently adapted to similar changes in working hours, for example in France in 1998. *MG*

ATMOSPHERIC SCIENCE

Guano cools Arctic

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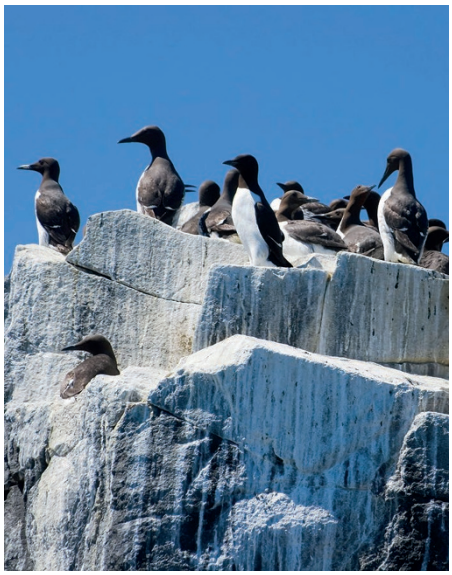

HILARY MORGAN / ALAMY STOCK PHOTO

Clouds play a key role in modulating surface temperature. Their formation is influenced, in part, by the availability of cloud condensation nuclei (CCN) — small particles upon which water vapour can condense. In the Arctic, where rapid climatic change has been observed, the pristine summertime atmosphere is particularly sensitive to CCN number.

Betty Croft from Dalhousie University, Canada, and colleagues examine a previously unquantified biological–atmosphere coupling; the impact of seabird colony guano on cloud properties in the Arctic. Observations from Nunavut, Canada are used alongside simulations from a state-of-the-art chemistry–climate model that incorporates an active particle formation scheme.

The authors reveal migratory seabirds as a key summertime source of CCN, linked to ammonia emissions from guano decomposition and subsequent particle formation. Simulations indicate that these particles spread throughout the Arctic where they grow and modify cloud characteristics, which can increase cloud albedo. This guano-related CCN effect cools the Arctic by –0.5 Wm^{-2}, but up to –1 Wm^{-2} near the largest colonies. These natural biochemical interactions represent a regionally important process given substantial anthropogenic warming in the Arctic. *GS*

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