

From the archive

A call to rename the proton in William Prout's honour, and an architect and sanitary engineer's treatise on how to keep a healthy house.

100 years ago

The amazing advances in our knowledge of the composition and structure of matter achieved during the past few decades constitute an important ... step toward the establishment of the essential unity of the physical universe. In reviewing the epoch-making work of J. J. Thomson, whose electrical theory of matter underlies all recent developments in this field ... one should not be unmindful of the contribution made over a century ago by his compatriot, William Prout, an early apostle of unity. To all students of chemistry Prout's hypothesis, published in 1816, to the effect that all of the elements are formed from hydrogen by some process of condensation or grouping, has been familiar ... In recognition of the genius and insight of William Prout it is suggested herewith that the name "proton" recently assigned to the unit charge of positive electricity, be modified, with some small sacrifice of etymological accuracy, to "prouton".

From *Nature* 1 December 1923

150 years ago

What a House should be, versus Death in the House. By William Bardwell, Architect and Sanitary Engineer — The subject of drainage ... has been forced into prominence by the dangerous illness of the Prince of Wales, in the Autumn of 1871; and this work meets to some extent the demand for further and better information on the subject ... It would be interesting to have had some references given to sanction our author in claiming the authority of the Duke of Wellington, together with that of ... his successors, for the practice of placing their beds nearly north and south so as to be in the line of the magnetic current. The theory no doubt has its advocates, but can hardly be of universal application, as there are many sound sleepers at all degrees of orientation.

From *Nature* 27 November 1873



compounds provide new data points, which are poised to enhance theoretical models and deepen our comprehension of aromaticity's role in molecular architecture.

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Climate change

Tackling poverty need not impede climate action

Katharine L. Ricke & Gordon C. McCord

A study has revealed that eliminating extreme poverty would result in a relatively small increase in global greenhouse-gas emissions, dispelling the idea that efforts to combat climate change and poverty are incompatible. See p.982

Among the 17 goals set out in the United Nations' 2030 Agenda for Sustainable Development (see sdgs.un.org/goals), eliminating poverty tops the list, and the 13th goal – combating global climate change – puts the 2030 agenda alongside the 2015 Paris climate agreement in terms of its impact on international climate policymaking¹. But how does stamping out poverty affect the bid to stop climate change? Not as much as one might think, it turns out. On page 982, Wollburg *et al.*² estimate that eliminating extreme poverty by 2050 would raise annual global greenhouse-gas emissions by less than 5%. And this number shrinks by a factor of ten with a climate-smart version of growth that includes improved technologies and reduced inequality.

The authors analysed a rich data set³ containing the income distributions of 168 countries, drawn from household surveys that were compiled by the World Bank, with which Wollburg and colleagues are affiliated. They looked at the relationships between income and consumption, and estimated future changes to a country's economy on the basis of information about its past and that of other countries. The authors then extrapolated past trends to calculate the amount of economic growth needed to reduce extreme poverty levels in all countries to 3%, the threshold below which the World Bank considers extreme poverty eliminated. The authors conducted similar analyses of the relationships between income and energy use, as well as energy use and

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greenhouse-gas emissions, to estimate how much this economic growth would increase the atmospheric concentrations of gases linked to global warming.

The main driver of poverty reduction is the growth of a country's overall economy⁴ – the remainder can be linked to reductions in income inequality. The assumption is that this growth will have an impact on the climate, because increased production and incomes give rise to elevated emissions⁵. Previous studies^{6–8} have estimated the rise in emissions associated with increasing the consumption of only impoverished populations, and reported numbers ranging from less than 1% to 3% of contemporary global emissions. However, Wollburg *et al.* assumed that eliminating poverty would increase the consumption of a country's entire population, not just those who are living in poverty. Intuitively, it could be expected that this way of calculating would greatly increase the estimated impact of eradicating poverty on climate change. But that is not what the authors found.

Even when Wollburg *et al.* applied conservative assumptions of no energy technology or efficiency improvements beyond those observed in other countries in the past, they found that eliminating extreme poverty would increase annual global emissions in 2050 by just 4.9% of their 2019 value (Fig. 1). When modest reductions in income inequality, increases in energy efficiency and improvements in energy technology are included in

the calculations, the increase in emissions would be just 0.54%. This drives the authors' important and powerful conclusion that the urgency for climate action and the urgency to eradicate extreme poverty are not in conflict.

The World Bank defines extreme poverty as having an income below US\$2.15 per day⁸, but the authors also calculated the climate-change implications of eliminating poverty at higher income thresholds. For example, to eliminate poverty at the \$6.85 threshold (the typical poverty line in upper-middle-income countries), annual global greenhouse-gas emissions in 2050 would balloon by 46%. This result points to a much bigger challenge of sustainably achieving prosperity through the historically observed patterns of economic growth and technological improvement.

This also highlights a way in which Wollburg and colleagues' analysis might downplay the climate implications of accelerating growth to end extreme poverty before their study's imposed deadline of 2050, which differs from the UN's target date of 2030. The authors showed that eliminating extreme poverty in 2023 would still result in an increase in annual emissions of around 5% by 2050. But climate risk depends on cumulative, not annual, emissions⁹, so the path that the world takes to reach a given benchmark matters (Fig. 1). Any timeline that is more ambitious than ending extreme poverty in 2050 would result in more cumulative emissions than those in the authors' baseline scenario. This makes a climate-smart trajectory, such as their best-case scenario, all the more important to pursue.

To isolate the effects on emissions of meeting a poverty target, the authors' model also allows a low-income country's economy to grow until the target is met, and then assumes zero economic growth after that point. But of course, in reality, if growth in low-income countries was accelerated to eliminate extreme poverty, their economies and emissions would continue to grow.

For simplicity's sake, Wollburg *et al.* assumed that future changes in climate and poverty will not be dependent on each other, but the two are inexorably intertwined. Poverty exacerbates the climate challenge – for example, because of the high population growth that goes hand-in-hand with poverty, and through emissions from frequent land clearing required to increase food production when agricultural productivity is low. More humans and fewer forests are both features of high-warming scenarios.

According to the World Bank (see go.nature.com/42a4ktf), the annual population growth rate of low-income countries was 2.7% in 2022, whereas this number was 0.7% for middle-income countries. Meanwhile, 23.2% of the total land area of low-income countries was covered by forest in 2000, but this fell to just 20.3% in 2020. By contrast, the forest cover

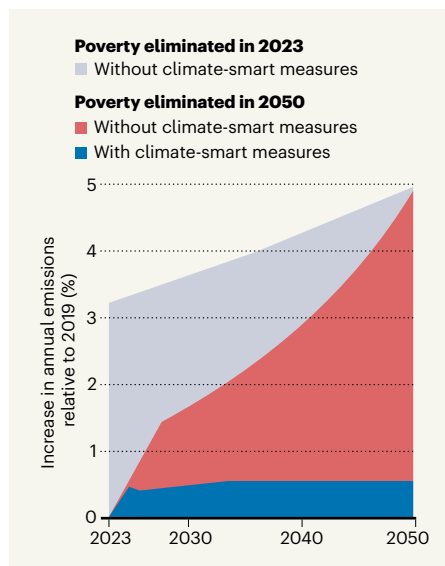


Figure 1 | Emissions implications of reducing extreme poverty. Wollburg *et al.*² used World Bank data to estimate that eliminating extreme poverty would increase annual global greenhouse-gas emissions by 4.9% relative to their 2019 value in 2050. Cumulative emissions determine climate risk⁹ and this risk will be much lower if certain climate-smart measures are taken. The authors considered the effects of such measures, including increasing energy efficiency, decarbonizing energy sources and reducing income inequality. They found that combining all of these measures would reduce the increase in annual emissions to just 0.54%. (Adapted from Fig. 3 and Extended Data Fig. 9b of ref. 2.)

of middle-income countries reduced by 1% (to 33.7%) in the same time frame – making deforestation nearly three times faster in low-income countries.

The impact of climate change will hit people living in poverty disproportionately. Extreme climate events already result in higher mortality in low-income countries than in high-income ones¹⁰. Around the globe, most people living in extreme poverty live in tropical or dryland ecologies where climate change will generate steep challenges for food production, cause direct heat stress and give rise to vector-borne infectious diseases – such as malaria and dengue. These issues are all likely to reduce human productivity and economic growth, trigger displacement and migration, and potentially exacerbate conflict – making poverty reduction an even greater challenge. Future research could explicitly account for such feedbacks.

Although it might seem intuitive that the challenges of climate change and extreme poverty are interrelated, there is nevertheless a risk of falling into a debate over the targeting of resources. The World Bank has explicitly incorporated combating climate change into its 2022 roadmap¹¹, which has led to some pushback from low- and middle-income countries that do not consider climate-change

mitigation a top investment priority, and would like donations from high-income countries to continue to fund other issues, such as improving education and health (see go.nature.com/44kghhe). There is also the concern that shifting resources towards climate action in the poorest countries pushes mitigation costs onto populations that have contributed the least to the global problem.

Crucially, climate finance for low- and middle-income countries must not draw funding away from existing economic development priorities. There is ample room within existing commitments to increase funding for both climate mitigation and poverty reduction in these nations. High-income countries have long committed to provide 0.7% of their gross national income (GNI) in official development assistance to low- and middle-income nations, but wealthy ones currently provide only 0.36% of their GNI. High-income countries also pledged to reach an annual donation of \$100 billion to less-wealthy nations for climate finance by 2020, but so far they have fallen short, by up to 80%, according to some sources¹².

Over the long term, climate-change mitigation and reducing extreme poverty worldwide are inseparable challenges. Nonetheless, Wollburg and colleagues' conclusion that eliminating poverty would raise annual greenhouse-gas emissions by just 5% offers welcome impetus to scale up efforts to overcome both of these challenges.

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Correction

The News & Views article entitled 'Tackling poverty need not impede climate action' erroneously stated that high-income countries pledged to reach an annual donation of \$10 billion to less-wealthy nations for climate finance by 2020. In fact, the pledge was for \$100 billion.