

The food–climate nexus



The latest report from the Intergovernmental Panel on Climate Change reminds us that unless mitigation and adaptation measures are implemented at the required pace, their costs will rise while their effectiveness will fall. Food systems are at the centre of this debate, offering opportunities for both.

Food systems will continue affecting and being affected by climate change. Our choices are more critical and urgent than ever before, and the solution to the current crisis is not just technological – it is also institutional, financial, political and behavioural. These messages, already known to *Nature Food's* readership, were reinforced by the Intergovernmental Panel on Climate Change (IPCC) at the launch of its synthesis report¹. Considered a summary for policymakers, the report draws together key findings on the physical science of climate change, as well as mitigation and adaptation strategies presented over the past two years as part of the panel's latest assessment report cycle ('AR6') – the most comprehensive in the IPCC's 35 years of existence.

While responsible for about a third of global anthropogenic emissions², food systems are negatively affected by climate change, which poses a threat to food security and requires urgent adaptation measures³. Food systems also offer several opportunities for mitigation, spanning crop and livestock production⁴, diets^{5,6} and land use⁷, among others. Action is needed in all sectors to achieve the Paris Agreement targets; food-related mitigation and adaptation are often less costly and easier to implement due to other sectors' lock-ins and offer immediate side benefits in terms of human health and environmental conservation. Strategies delivering mitigation and adaptation simultaneously should be

prioritized; low-carbon agriculture, sustainable healthy diets, integrated biomass and bioenergy solutions⁸, and food loss and waste reduction⁹ are a few examples.

Relative to previous assessment reports, the AR6 presents stronger evidence of loss and damage, a narrower range of costs and benefits associated with concrete climate solutions, and greater participation of social scientists in recognition of the human dimensions of climate change. For the first time, estimates have shown that the global economic benefit of pursuing warming stabilization outweighs the costs of mitigation. The AR6 also has a more integrated approach to risks, impacts and response measures, including the analysis of synergies and trade-offs related to specific changes in the different sectors of the economy. Although the report shows that there has been some progress in slowing down climate change, the scale and speed of transformation are still very far from what is needed to ensure that global warming is kept under the 1.5 °C target set by the Paris Agreement.

Nature Food's recently launched online Collection 'Food–Climate Nexus' gives a flavor of the journal's contribution to risks and impact assessment, mitigation, adaptation and so-called win-win solutions. These studies have shed light on crucial aspects of food systems and their link to climate, and certainly offer valuable evidence for policymakers to start acting. Yet, food systems research must advance further in support of this process. Many of the models on which the AR6 are based look at the availability of calories but not nutrients, include only a few food technologies and rarely account for the other three pillars of food security – namely accessibility, utilization and stability. Data limitations also impair the granularity of modelling results, their consistency across scales and the representation of context specificities.

Inclusiveness and equity are two more aspects of food systems that require greater

attention from researchers and that are key to food systems transformation. The AR6 synthesis report has made it clear that low-income groups have the largest gaps in adapting to climate change, and that climate justice can help close them while broadening support across society to help deliver the scaled-up and far-reaching climate action we need in this decade. The report has a high confidence that the greatest gains in wellbeing come from prioritizing climate risk reduction for low-income groups. Clearly, many parallels exist between food justice and climate justice.

A final and crucial point relates to the poor representation of adaptation in quantitative climate assessments¹⁰. Climate impact models and integrated assessment models, typically used to assess future scenarios of climate change, are currently limited in their ability to predict the costs or effectiveness of specific adaptation measures in different contexts. This is particularly problematic given that the 1.5 °C degree target looks increasingly unfeasible, and that the AR6 might be the last assessment report before global warming surpasses the 1.5 °C degree target. As IPCC scientists have put it during the press conference held at the end of March, we are beyond the point of saying climate change is someone else's problem; action is needed at all levels, and researchers should also do their part.

Published online: 25 April 2023

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