New land use approaches required to address climate change, biodiversity and other global crises

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A new report released today in the *Proceedings of the National Academy of Sciences* of the United States of America (PNAS) is a call to action

for policymakers worldwide seeking to develop sustainable and equitable solutions to our most urgent global challenges. "Ten Facts about Land Systems for Sustainability" was co-authored by 50 leading land use scientists from 20 countries. A companion report offers specific examples to help policymakers and the public understand what's at stake at this critical moment in global development.

"Global agreements on climate change, biodiversity, and development are increasingly focused on land management as the solution to a long list of challenges," said Ariane de Bremond, Executive Officer of the Global Land Programme, which convened the authors to develop the study. "There is a real urgency for decision makers to understand that meeting our sustainable development goals in a way that's equitable will require policies that account for the ten facts explained in the study."

The study is intended to inform policies aimed at addressing challenges like how to limit the impacts of climate change, designing systems for sustainable food and energy production, protecting biodiversity, and balancing competing claims to land ownership. It also details implications for policymakers to consider if they hope to develop economically, culturally, and environmentally sustainable solutions to these complex challenges.

"Many policy projects, such as reforestation to absorb carbon or setting up nature conservation areas, ignore lessons learnt by land system scientists," said Dr. Navin Ramankutty, co-chair of the Global Land Programme and Professor at the University of British Columbia. "This paper presents a checklist of basic facts that must be considered in effective policymaking where land is concerned."

The 10 facts outlined in the study speak to the relationship people have with the land itself on a physical level as well the social, economic, cultural, environmental, and spiritual implications of how land use

decisions are made and by whom. These facts, as jointly identified by the study's co-authors, are:

1. Meanings and values of land are socially constructed and contested. Different groups place different values on what makes land useful, degraded, or culturally important. Top-down policy agendas are often rooted in one dominant value system.
2. Land systems exhibit complex behaviors with abrupt, hard-to-predict changes. Policy interventions are typically intended to solve a particular problem, but often fail when they ignore system complexity. Addressing one problem in isolation can result in unintended harm to natural areas and people.
3. Irreversible changes and path dependence are common features of land systems. Converting land from one use to another, such as the clearing of old-growth forests, leads to changes felt decades to centuries later. Restoration rarely brings land back to a state that truly matches original conditions.
4. Some land uses have a small footprint but very large impacts. Cities, for instance, consume large amounts of resources that are often produced elsewhere using vast amounts of land; they can also reduce negative impacts by concentrating human populations on a relatively small land footprint. Net impacts can be hard to measure and predict.
5. Drivers and impacts of land-use change are globally interconnected and spill over to distant locations. Due to globalization, land use can be influenced by distant people, economic forces, policies, or organizations, and decisions.
6. We live on a used planet where all land provides benefits to societies. People directly inhabit, use, or manage over three-quarters of Earth's ice-free land, with more than 25% inhabited and used by Indigenous Peoples and Local Communities (IPLC). Even uninhabited lands are connected with people in different ways; no change in land use anywhere is free of trade-offs.

7. Land-use change usually entails trade-offs between different benefits —"win–wins" are rare. While land use delivers a range of benefits, such as food, timber, and sacred spaces, it also often involves trade-offs for both nature and some communities of people. Land use decisions involve value judgments to determine which benefits to prioritize, and for whom.
8. Land tenure and land-use claims are often unclear, overlapping, and contested. Rights to use and access land can overlap, belong to different people, or to different kinds of access as in rights to ownership or use.
9. The benefits and burdens from land are unequally distributed. A small number of people own a disproportionate amount of land area and land value in most countries around the world.
10. Land users have multiple, sometimes conflicting, ideas of what social and environmental justice entails. There is no single form of justice that is fair for all. Justice means different things to and for different people, from recognizing the claim of indigenous groups to land, to impacts on future generations, to what systems are used to determine whose claims are given priority.

These facts shape the effectiveness and social and environmental impacts of policies and decisions involving land, from climate change mitigation and adaptation, to food availability, to biodiversity and human health. The study also identifies approaches for policymakers to consider when working to address challenges that are affected by land use. The authors also encourage policymakers to recognize that trade-offs are much more common than win-win solutions, and policies that explicitly acknowledge this dynamic and the importance of ongoing evaluation and recalibration are likely to deliver more equitable outcomes. Land use governance can be improved by acknowledging unclear and overlapping claims to land rights and ownership and developing systems that take into account the rights and perspectives of marginalized groups.

"It is time to move beyond a quest for 'sustainable land uses' and rather think about 'achieving sustainability through land use.'" Patrick Meyfroidt, lead author of the study and professor at UCLouvain in Belgium, concluded. "Hopefully, these facts and their implications can provide more solid foundations for much-needed conversations on land use and sustainability as global policy is developed."

"How we use our land will determine if humanity can rise to the challenge of fairly dealing with climate change, halting biodiversity loss and providing decent livelihoods for all," added Casey Ryan, co-lead author of the study and Reader in ecosystem services and global change at the University of Edinburgh. "This work brings together decades of work to show why it is so hard to manage land for sustainability, but also shows how it can be done."

More information: Ten facts about land systems for sustainability, *Proceedings of the National Academy of Sciences* (2022). doi.org/10.1073/pnas.2109217118

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