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Inequalities are ubiquitous in every society on Earth, and the COVID-2019 pandemic has exposed the marginalized communities that suffer the most. A warming planet will only magnify this gap. On the eve of the 26th session of the Conference of the Parties to the UNFCCC, this Voices asks: how can science inform and address inequalities?

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Water resilience requires social equity
The COVID-19 pandemic has highlighted profound social inequalities within and across countries. From water disconnections, shortages of water-treatment chemicals, and growing demands for water in support of public health measures to droughts, floods, and wildfires, communities around the world face deeply uneven water challenges, further deepened by a changing climate.

Science has never been more important for informing and shaping our responses to the global water crises created by the confluence of these pressures. However, the reality of unequal risks and capacities to cope or adapt means that science itself needs to be transformed to become more inclusive of diverse voices and experiences, open to different forms of evidence and ways of knowing. Science should more clearly reflect differentiated vulnerabilities, and, in turn, scientific advice should focus on resilience-building policies and actions that respect and prioritize those most vulnerable.

This means embracing consent-based co-design approaches that recognize that communities value water differently and experience water risks in dramatically different ways. This also means centering resilience-building efforts on social equity—the ongoing commitment to fairness, justice, and equality. Social equity is a prerequisite for resilience, or the ability to face crises, cope, and even thrive. Equitable communities are more resilient to water risks, and higher social equity leads to better decision-making.

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Pursue fairness in recognition of Indigenous lands
The lands and territories of Indigenous peoples extend over one-quarter of the global land surface. It is no coincidence that these lands intersect with up to 40% of remaining natural ecosystems, with ample evidence that collective and community forms of land tenure and governance are the best chance of keeping natural lands intact. Yet formal recognition of collective land rights exists across only 10% of the world’s lands, making Indigenous communities vulnerable to dispossession and displacement when unprotected lands are cleared for agriculture and extractive purposes. This has led to disparities in rights and access to land, pushing Indigenous communities from the land and putting their livelihoods and even lives at risk. Land clearing is also the leading driver of biodiversity loss and contributes around 12% of annual greenhouse gas emissions, thus warming the climate. Climate change in turn further drives biodiversity decline, which contributes to zoonotic diseases—the transfer of new diseases from animals to humans. If we don’t halt ecosystem destruction and start restoring natural lands, we will see increased warming and more pandemics. Yet instead, there are increasing threats to Indigenous peoples, with traditional practices often criminalized as governments and big business force people from their lands, further widening inequalities. Science can help to address the inequalities that leave collectively held lands vulnerable to dispossession, for example, via satellite data that assist community mapping, enabling formal recognition of land rights. But most importantly, it can help through recognizing Indigenous knowledge systems as key scientific contributions in our responses to climate mitigation and adaptation.
Migration: A key to climate-resilient development

In a changing climate, increased frequency and severity of extreme climate events (floods, storms, droughts, and wildfires) combined with rising sea levels will generate growing numbers of migrants and involuntary displacements of people. Before the pandemic hit, governments around the world—especially western governments—were tightening their borders, restricting migration, and criminalizing people who sought nothing more than an opportunity to work and a safe place to live. COVID-19 travel restrictions expanded this curtailment of people’s mobility. As we “build back” from the pandemic and pivot to face the even bigger challenge of climate change, the circumstances under which migration occurs will be a key determinant of our long-term prosperity. Safe, regulated, and legal migration benefits migrants; it also benefits sending and destination communities. Restricting migration limits the economic prospects of people, communities, and nations, rich and poor alike. A growing body of scientific research demonstrates that migration is a necessary component of climate-resilient development and helps vulnerable communities adapt to climate change. Yet popular and political discourses about migration continue to be laced with erroneous (often racist) stereotypes about who migrants are, why they migrate, and their potential contributions to society. Scientists must counter this with facts and evidence. We must use our training to demonstrate systematically how the broader goals we all agree upon—building sustainable prosperity for our children, fortifying human rights, responding to the impacts of climate change—are more easily achieved when people have greater freedom of movement within and between countries.

Tackling smallholder vulnerabilities

Studies have shown that, globally, smallholder farmers are among the most vulnerable to climate change, and this vulnerability will likely increase in the future as climate-induced stresses and shocks increase the risks of crop failure, livelihood displacement, and food insecurity. Smallholders’ heavy reliance on rain-fed cropping systems, their tendency to cultivate marginal lands, lower resource endowments, and lack of access to formal safety nets negatively impact their ability to adapt to existing climate impacts and build resiliency to future changes. For example, my research in the Caribbean has demonstrated how climate-induced shocks such as hurricanes and droughts have disproportionately impacted small-scale resource-poor farmers and communities, largely owing to their lower resource endowments and the historical ways smallholder farming systems have been neglected by state-led policies in favor of large-scale export agriculture. And although many smallholder farmers are already employing a variety of risk-scoping strategies, these are likely insufficient to build resilience in smallholder cropping systems, owing to underlying resource and capacity constraints. The application of scientific research and innovations that can help inform the formulation of novel and effective climate adaptation solutions at the community level, while adopted to the diverse socio-economic and biophysical conditions smallholder farmers must contend with, will be crucial in reducing vulnerabilities associated with smallholder farming systems and avoiding some of the worst effects of climate change.

Political, not technical, paths to energy justice

New energy technologies, from renewable generation to battery-storage systems, proliferate. But will energy abundance solve social and environmental problems? For techno-enthusiasts, the answer is yes. For some, the green future looks like the present, just without the emissions. Here, we imagine electric instead of gas-guzzling cars, buildings lit by hydropower rather than coal-powered electricity, and jet travel on hydrogen, not fossil aviation fuel. For others, the future looks bright, but different: innovative technology disrupts the status quo. In this view, wind turbines and solar panels enable distributed power generation and increase local democracy, and dispersed production unsettles corporate control.

However, fuel substitution alone does not resolve inequality and environmental exploitation, and new political relations do not arise directly from technology. The current pandemic, alongside intensifying climate disasters, has laid bare underlying inequalities along intersecting racial, geographic, gender, and socio-economic lines. In response, we need to re-evaluate who produces and uses energy, who develops
and owns generation and transmission systems, and who bears the burdens and gains the benefits from the work done by the energy produced.

Achieving an equitable, just, and sustainable future requires truly “building back better”: altering ownership, investment, and trade relations to upend existing structures of wealth, security, and power.

**Environmental injustice, health, and extractivism**

Hundreds of studies show that low-income communities and communities of color (e.g., Indigenous and Native nations and Black and Latinx neighborhoods) experience inequitable exposures to environmental hazards and tend to be excluded from environmental policy-making and decision-making processes. Extractive industries are a prime example. Uranium, coal mining, and oil and gas production, for instance, are often located near low-income communities and can act as epicenters of environmental injustice. Nearby communities and workers are inequitably exposed to contamination hazards and could also face economic instability, because these sectors are prone to boom-bust trends where commodity prices in global markets can change quickly. Exposure to toxicants can also lead to adverse public environmental health problems, such as cancer clusters, reproductive problems, or neurological symptoms. In the case of US uranium extraction, Diné (Navajo), Laguna Pueblo, and Hopi nations (among other communities) still contend with legacies of radioactive uranium contamination—especially cancer clusters, environmental risks, and uncertainty about living near abandoned mines. Roots of these injustices can be resolved through just transitions that center on community well-being, while addressing colonial violence and climate injustices. But to succeed, structural solutions such as transitions from neoliberal, industrial capitalist economies to more regenerative, distributive systems must have marginalized groups at the helm.

**Prioritizing land justice in US post-pandemic recovery**

How should society recover from the pandemic while decarbonizing and adapting to climate change? The pandemic laid bare the intersectional inequalities that make the working class and racialized minorities disproportionately vulnerable. Compared to white Americans, Black, Hispanic, and Indigenous Americans were twice as likely to go hungry, 1.5–2 times more likely to be unemployed, and 1.2–1.4 times more likely to die during the pandemic. Urban land governance has shaped a built environment that contributes to this inequality. For instance, zoning has relegated poor people (Black Americans especially) to less-safe lands, cities have implemented urban-renewal projects through what communities these groups could build, and new parks and amenities built in poorer areas that push up land prices can displace previous renters. This racist history shows that economic-recovery funding aiming to improve the well-being of society’s most marginalized must not only prioritize infrastructure upgrades like seawalls and street trees in poor communities but also redress the zoning, tax, and development policies that treat marginalized groups as expendable. Our data and climate science continue to be much better at understanding a single sector, hazard, or time horizon, although new advances are moving toward dynamic and multi-risk models. But the social science is clear that future climate moonshots must center intersectional justice and solutions that consider multiple challenges holistically, or we will risk repeating the hubris of past large-scale urban-land-governance interventions that solved targeted problems while creating a new generation of racism, classism, and sustainability challenges.
Science contributes to building smallholder farmer resilience

The COVID-19 pandemic, climate change, and growing inequalities highlight a critical need to ensure our governance systems can protect the most vulnerable people participating in economic systems, such as smallholder farmers. At IISD, we help policymakers make evidence-based decisions to address inequality challenges via independent and rigorous research.

We recently surveyed 57 supply-chain actors in six countries in the Global South to discover how farmers are coping with the effects of the pandemic and whether certification through voluntary sustainability standards (VSSs) can help them adapt and build resilience to external shocks. We brought in the voice of farmers to better understand how policies and actions can ensure fairness in post-pandemic recovery.

The results suggest that VSS-compliant markets can help smallholder producers be more resilient by offering higher prices and premiums than those offered by conventional markets and by providing stronger supply-chain relationships that facilitate market access, market diversification, and training for producers. However, VSSs alone do not protect farmers from international price volatility or asymmetric power relations in supply chains and

By producing this type of study, researchers can support policymakers to make decisions that help address the inequalities smallholder farmers face. In our case, the study findings informed recommendations for governments to support smallholder farmers by providing regular training on climate-smart agricultural practices, facilitating relationships between producer organizations and other supply-chain actors, and building demand for sustainable products.

More qualitative analyses in inequality research

An important insight that the social sciences can offer to research on inequality in the global climate regime, e.g., United Nations Framework Convention on Climate Change (UNFCCC), is that both inequality and its effects are multi-dimensional and multi-scalar. They are multi-dimensional in the sense that we need to understand inequality as an issue that goes beyond economic inequities, which is by far the dominant, yet limited, perspective. Inequality has an impact across the different spheres of the UNFCCC. This includes an inequality disadvantaging developing countries that suffer strongly from the effects of climate change although they have generated fewer emissions, an inequality in capacities to provide solutions to the challenge, an inequality in the abilities to adapt, as well as an inequality in voice, access, and impacts on climate negotiations. Inequalities are multi-scalar in that they affect individuals, cities, regions, nation-states, and coalitions in different ways and are hence a phenomenon to be considered holistically. Many of these phenomena are only analyzed quantitatively, and they lack qualitative and interpretative work that allows us to better understand underlying beliefs, narratives, identities, etc., in an inclusive manner that may either curb or propel progress in climate change politics across the board. This not only is relevant for the inclusion of previously marginalized Indigenous peoples, activists, or, more generally, actors from the Global South but also relates to scientists making decisions about what kinds of factors to include into climate models, how to interpret the results, and the kinds of implications policymakers could draw from these theoretically objective models.