

OUR TIME BEGINS NOW

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Even at the time of its signing in 2015, it was clear that the Paris Agreement on climate change would not be enough to avoid global warming of 1.5° C over pre-industrial temperatures. In fact, early analyses revealed that the collective effect of Nationally Determined Contributions (NDCs) would result in 3-5° C of warming. More recently, there has been mounting pressure on India to raise its pledges further. The Intergovernmental Panel on Climate Change (IPCC) report on 1.5° C has come at a time when there are multiple alarms for India. Another study in *Nature Climate Change* identifies India as the country with the most expected damage from rising levels of carbon dioxide. How should India respond?

India's NDC is already ambitious and it has made decisive changes in its energy sector. Meanwhile, the U.S. has pulled out of the climate treaty, and the support of Australia and Brazil teeters on the outcome of their respective elections. Some countries are also doing less than they claim. According to Kevin Anderson at the University of Manchester, with aviation, shipping and trade counted, the U.K. has made no reduction to its greenhouse gas emissions.

India has two complex and inter-related problems. The first is to bring a vast population out of poverty and into decent lives. The second is to do this while dealing responsibly with the global carbon challenge and building resilience to climate change.

While India is often mentioned along with China in climate-related discussions as a large emerging economy, the two are very different. India ranks 130 among nations in the Human Development Index, and China ranks 86. In spite of remarkable recent improvements, India still has 364 million living in multidimensional poverty. Nearly a third (27.5%) are multidimensionally poor and about a fifth (19.1%) are vulnerable to becoming poor. Almost half the country is therefore at high risk from events such as loss of a job or ill health of a family member. Combined with damage from a severe cyclone, flood or drought, each subsequent shock will have a multiplier effect on hundreds of millions, potentially pushing them deeper into poverty.

Add to this the current rural distress and the large youth bulge with few job prospects, and the country is in dire straits. It is clear that past development frameworks have not improved well-being across social strata. Instead, evidence indicates that economic growth has gone hand-in-hand with rising inequality and the creation of a small but powerful class of the super-rich.

It turns out that the most sensible way to deal with these complex challenges is to deepen and expand India's commitment to the Sustainable Development Goals (SDGs). The synergies of meeting SDGs, reducing greenhouse gas emissions and adapting to a changing climate can only be fully realised if transformative and cross-scale changes are conceived, deliberated upon and tested widely. Further, "scaling up" may not be the correct way to think about what is needed; rather, replication with context-relevant modifications through local and institutional innovation may be more appropriate for a country of India's size and ecological diversity.

The 1.5° C report calls for societal transformation on a global scale that "reflect[s] the links, synergies and trade-offs between mitigation, adaptation and sustainable development." Recent events, however, show that we cannot trade off forests, urban water bodies, riverine ecosystems, waste management or groundwater as these come back to bite us as floods, landslides, droughts and infectious disease.

India, nevertheless, has a large number of successful examples of transformative innovation around energy production and access, land, livelihoods and climate resilience. The Bureau of Energy Efficiency showed how government 'nudges' are made effective through appliance labelling and large-scale procurement of efficient devices. In the building and cement industry, innovation around housing and new materials, including natural fibre composites, could make far-reaching changes in infrastructure through low-carbon modular technologies.

India expects to reach its ambitious solar target of 100 GW capacity by 2022 primarily through large centralised solar power plants, but these require significant amounts of land, water and evacuation infrastructure and support from mega-corporations. Instead, as some States have shown, renewable-based microgrids can become an important feature of electricity policy. Jharkhand, which has 249 remote villages powered by solar microgrids, is now considering their use even in villages that are already grid connected.

In the near future, entrepreneurs could make use of rapidly lowering storage costs to build decentralised, neighbourhood-scale micro-utilities, managed by locally owned enterprises and cooperatives. With modern power electronics and innovations in hybrid waste to energy, water recycling and community gardens could be integrated as standalone modules that are connected to larger grids.

Sustainable approaches to land are evident in cases such as forest conservation in Mendha-Lekha village in Maharashtra and community delivery of public services in Nagaland. These and several other instances are documented in initiatives such as Vikalp Sangam. Similarly, in a recent comment in *Nature*, Harini Nagendra points out that India has for long had strongly rooted cultural movements about living sustainably with land and its ecology that provide practical models.

Some research groups have recognised that agro-ecology methods are best suited for increasing crop yield, raising profits, trapping soil carbon, reducing dependence on fertilisers and pesticides. Successful models are already effective on small scales in many States. Andhra Pradesh is attempting to replicate widely one such approach, Zero Budget Natural Farming, to all its farmers by 2024 with an expected savings of 2 million tonnes of carbon dioxide per year. This is with 6 million farmers across 8 million hectares. If similar methods were used for the entire country, the savings would be substantial.

In transport and urbanisation, the challenge is to create isotropic communities in the areas of the peri-urban, the rapidly expanding hinterland, which would have to be designed around not cars but walking, cycling and sustainable neighbourhood vehicles. Work and industry would also have to focus on the small and medium scale of about 300 employees and modest capital investments, which reduce the risk of speculation and jobless growth.

Energy and livelihood gains from such alternative visions could be far more significant than conventional ways of replacing fossil-fuelled infrastructure with renewables. But they also involve a lot of learning-by-doing, living laboratories and innovation, practice, patience and support from government and academia.

The next round of state action plans on climate change now being developed might begin with identifying successful development approaches overlaid with expected climate impacts in each ecological zone. Policymakers, with inputs from academia, community workers and the public, could then work on how these would be repeated in other contexts keeping climate impacts in mind.

Large investments are needed to make the transitions in each sector that would take the country

to a near zero-carbon economy. But given the shortage of external support and the need for rapid deployment, India will not be able to rely entirely on external funds. Some of this could instead be financed through a 'luxury' carbon tax that curbs non-essential consumption. Savings can also be expected from the economic and social transformation itself.

Political pressure and activism across the globe may soon turn the tide in other countries, but India needs to begin now with its enormous untapped successes. We cannot be pressured from outside, but need to change from within.

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