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**COMMENTARY**

# Why India Needs a Unique Approach to Sustainability

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## 1. INTRODUCTION

When the United Nations Conference on Environment and Development propelled sustainable development into the lexicon in 1992, India's population was about 900 million (United Nations 2019), 45% of the population lived below poverty line (World Bank 2019), and over 70% of the population lived in rural areas (United Nations 2018). Today, with its population approaching 1.4 billion, a decline of more than half in the proportion of people living in poverty, liberalized economy, mushrooming towns and cities, highways expanding across the country, and wide-spread aspirations for modern conveniences, the twentieth-century concept for sustainable development stands on its head.

Equity and social justice for the current generation are at least as essential as the 1990's notion of intergenerational equity to "meet the needs of the present without compromising the ability of future generations to meet their needs" (Brundtland 1987). As environmental justice and the voices of those who have not shared in the benefits of economic growth have become stronger in the twenty-first century, no one-size-fits-all pathway to sustainable development applies across countries or all places within countries. India's trajectory calls for its own type of sustainability, one that builds from its unique, sometimes paradoxical and mind-boggling complexity.

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## 2. NEXT GENERATION FOOD SYSTEMS

One of India's greatest paradoxes is the success and failure of the Green Revolution. Cereal production increased more than 2.3 fold since the 1960s and even outpaced population growth. Horrific famines, such as the Bengal famine of 1943 and the Bihar famine of 1966-67, have not occurred since the Green Revolution, and India has transitioned from a food-importing to a net food-exporting country. But these successes are tempered by the one-size-fits all adoption of rice-wheat production systems that displaced local varieties of millets and sorghum. Yields increased, but the loss of nutritionally-rich traditional cereals reduced net iron intake by 21% in rural diets and 10% in urban diets between 1983 and 2011, with the greatest loss (32%) in the lowest income quartile of rural households (DeFries *et al.* 2018). The tide may be turning, with some improvements in children's nutrition and increased government attention on "nutri-cereals" and other ways to improve nutrition.

As the ability of farmers to withstand climate extremes takes on urgency, ironically the options for farmers to grow climate-resilient, nutritious traditional cereals have diminished in the decades following the Green Revolution. Such options can make the difference between disaster and survival. Transition to an agricultural production system that provides sufficient food, resilience to climate variability, and farmers' security lies at the heart of sound policies and interventions for the future. Sustainable agriculture is more than a buzzword for India where the needs for healthier food and farmer-friendly agriculture are so apparent. It underscores the health and productivity of the population and the economy.

## 3. WATER, CLIMATE, AND LAND USE

India's monsoonal climate creates another paradox that many other countries do not face. Too much rainfall during the monsoon and water scarcity in the dry season make storage a necessity. Ingenious and sophisticated water harvesting systems made civilization possible in India over millennia. Flooding in urban areas, as occurred in Mumbai in 2005 and again in 2017 when nearly a metre of rain in 24 hours overwhelmed the drainage system, illustrates the urgent need for urban planners to minimize impervious surfaces as cities and towns expand. Encroachment into the East Kolkata Wetlands, which absorb nutrients and runoff from the city, and development that paves over lakes constructed centuries ago to store water and catch storm flow in Bangalore, are two examples of urban land use counter to sustainable water management.

Watersheds with vegetation that absorbs water into the soil and recharges groundwater can contribute to India's long tradition of water management. Curiously, schemes to moderate water flows through upstream land management have been less prevalent in India than elsewhere, most notably in Latin America (Goldman-Benner *et al.* 2012). The complexities of land tenure and fierce competition for land among agriculture, conservation, infrastructure and other uses explain why payments-for-water-services is more difficult in the Indian context. India-relevant sustainable solutions for water management could provide multiple benefits for people, agriculture, and economy. Such solutions might entail forest management by communities to enhance the ability of forests to recharge groundwater, watershed restoration that provides economic benefits, urban planning with green spaces that absorb storm water and provide recreational spaces, and adoption of technologies for efficient water use in agriculture.

## 4. BIOLOGICAL HERITAGE

India's status as a mega-diversity country amidst intense human pressures is a paradoxical marvel. India is one of 17 mega-diversity countries, which collectively hold more than 70% of the world's biodiversity and each has more than 5000 endemic species (Mittermeier 1997). The country houses 4 of 35 global biodiversity hot spots: the Western Ghats, the Himalayas, north-eastern India south of Brahmaputra that is a part of Indo-Malaya hotspot, and southern Nicobar Islands, a part of the Sundaland hotspot. Moreover, an extraordinary 460 listed languages are currently spoken in the country with accompanying vast traditional knowledge about local diversity and cultural traditions (Eberhard, Simons, and Fenning 2019).

Unlike many other countries, India's wildlife protection laws are strong, and the government has invested substantially in protected areas to maintain its rich biological heritage. As in other emerging economies, expansion of rail, roads, and energy infrastructure is essential for development. The overlap in space between places suitable for infrastructure expansion and places crucial to maintain biological and cultural heritage warrants serious attention. The potential for infrastructure to fragment habitat, sever connectivity for wildlife moving between protected areas, and threaten gains from the investments in wildlife protection is high, particularly in the case of linear infrastructure such as roads, powerlines, and railways. The boom in infrastructure expansion challenges the historical commitment to conservation, unless planners and engineers consider the needs of wildlife and cultural heritage in decisions about where to site infrastructure. The combination of relatively abundant wildlife, small protected areas, and high

human population densities make this challenge particularly acute in India. Innovative decision-making processes could balance the needs for both infrastructure and wildlife through elevating the need to protect wildlife in the early planning stages of infrastructure projects. Where routing to avoid critical habitat is not possible, mitigation structures such as overpasses and underpasses can maintain connectivity (Dutta *et al.* 2015).

## 5. CLEAN AIR

Finally, severe local environmental concerns fall under the banner of sustainable development. The country is at the crossroads between twentieth-century environmental problems and twenty-first century global sustainability concerns. As many as 13 of the world's 20 most polluted cities, in terms of annual mean levels of particulate matter less than 2.5 μm in diameter (Gordon *et al.* 2018), are in India. A variety of sources contribute to these high levels of ambient pollution, including transportation, power generation from fossil-fuel burning, emissions from agricultural burning, trash burning and brick kilns. The relative contributions of these sources in different locations is still not clear, partially due to the paucity of monitoring. The meteorology and geography, with the Himalayan Mountains trapping pollution in the northern Indian plains, add to the difficulties of addressing the problem in the Indian context. Yet, major cities around the world have successfully overcome severe air pollution, including Athens, Paris, Los Angeles, Pittsburgh, and Mexico City (Pandis *et al.* 2016).

In addition to outdoor air pollution, more than three-quarters of rural households use solid biomass for cooking and are exposed to indoor air pollution that far exceeds permissible levels. Some programmes that promote biogas or LPG to replace fuelwood and dung as cooking fuel have proven effective with community involvement (Agarwala *et al.* 2017). A sustainable future can only exist if conventional environmental problems, such as indoor and outdoor air pollution, receive sufficient attention to reduce the problem. India has untapped potential to clean its air.

## 6. AN UNTRODDEN PATH

Overall, a development path in India that is sustainable, equitable, and respectful of the environment and human health is not optional, elitist, or a distant goal. Every day, over 1.4 billion people in the country depend on water, food, clean air, and the country's rich biological heritage for material and spiritual needs. A sustainable future will determine if these needs can be

met, which in turn will determine if people can engage in productive work, contribute to the growing economy, and meet aspirations for health and prosperity. The many paradoxes and complexities make India's version of sustainability both more urgent and more difficult than in other places. No country has yet found a sustainable path to development. There can be no pre-packaged solution. Efforts to reduce conventional environmental pollution, manage watersheds, diversify agriculture for climate resilience and nutrition, and plan infrastructure that maintains connectivity for wildlife are a few of many steps to provide a liveable environment for all. India's unique path will define the future for more than one-sixth of humanity.

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