Lessons learned from India's Green Revolution: Why the Green Revolution is highly relevant for today's world of pandemics, food insecurity, and uncertainty

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INTERVIEW

Lessons learned from India's Green Revolution

Why the *Green Revolution* is highly relevant for today's world of pandemics, food insecurity, and uncertainty

Partition of British India in 1947 triggered a huge refugee crisis in India. In addition, low agricultural yield and high population growth fueled food insecurity. The fear of the Bengal Famine of 1943 was still fresh and the Indian Government wanted to prevent further famines. The philanthropic organizations of the USA (Rockefeller and Ford Foundation) collaborated with Indian policymakers and scientists that helped in the groundwork of the Green Revolution. Jack Loveridge explains how technology and international cooperation contributed to India's Green Revolution and what lessons can be learned for the future. He highlights the challenges related to population control, environment, social and economic inequality in the Green Revolution were highlighted. Interview by Somidh Saha (ITAS-KIT).

TATuP: *Why is it worth analyzing the Green Revolution?*

Jack Loveridge: The Green Revolution marks one of the most consequential economic and environmental transformations of the twentieth century. As we grapple with a global pandemic that is, in many ways, a product of how we interact with the environment and how we secure our food, the Green Revolution reminds us of the promise of scientific innovation and the peril of expecting that technology alone will enable us to overcome our greatest challenges.

You have extensively researched the Green Revolution. How do you get to this thesis?

Deploying mechanized farming techniques, large-scale irrigation, chemical fertilizers, and high-yield varieties of wheat and rice enabled nations like India and Pakistan to double food grain production during the late 1960s and 1970s. These changes, which had been championed by the agricultural scientists of the Rockefeller Foundation working in Mexico, including Norman Borlaug, who was awarded the Nobel Peace Prize for his work, along with other large philanthropic organizations and international agencies, constituted what became known as the Green Revolution. In the prevailing spirit of the Cold War, William Gaud, then director of United States federal government's Agency for International Development (USAID), first applied the term to these initiatives in 1968, distinguishing between a science-driven "green" revolution and a "red" communist revolution. The Green Revolution still affects us all, particularly when we shop for food or sit down for a meal. We regularly consume grains containing the genes from strains developed during the Green Revolution and the relatively stable price of food grains over the past fifty years depended in part on the supply increases enabled by its science.

The legacy of the Green Revolution also demonstrates that the application of any technology may generate unintended consequences, namely pressures placed on the natural environment and the disruptions a shift to capital-intensive agriculture can cause for vulnerable communities. Effective policymaking can and should anticipate such potential social and environmental consequences and the historical experience of the Green Revolution can inform that process.

However, the use of technology to control human fertility and population growth failed. What were the reasons?

Population control addressed the other side of South Asia's food supply challenge of the early independence era – the second part of what Aldous Huxley characterized as "the double crisis" of food scarcity and population growth. Facing a global population boom, this was a sort of post-war reboot of Malthusian thought. In many ways, early philanthropy-driven efforts at population control in South Asia during the 1950s and 1960s did not accomplish their goals because they were invasive, expensive, and unevenly deployed. One of the major obstacles faced by the Rockefeller-funded Population Council was a lack of adoption of effective contraceptive methods across rural India. Education programs and trainings required social sensitivity, a long-term investment, and an intensive engagement of rural communities. Further, the technologies themselves had not yet been perfected, with efficacy research still in progress, so the Population Council itself noted that their failures diminished public trust more broadly.

What lessons can be learned retrospectively from this development?

When examining such measures retrospectively, it is important to ask for whom these programs were intended and why, considering the political agendas of population control efforts. We see stark class, caste, and gender divides within South Asia, with such programs being directed at the rural poor. This work unfolds over the two decades before and is distinct from the infamous forced-sterilization program implemented during the Emergency period from 1976 onward. Predictably, there was wariness of for-

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eign-directed population control measures within the Lok Sabha [editor's note: House of the People is the lower house of India's bicameral Parliament], even at this early stage. Among others, historians Alison Bashford, Matthew Connelly, and Sarah Hodges have addressed population studies and control efforts extensively, with Hodges in particular focusing on South India during the late colonial period – an era in which population control was heralded by modernizers as a path out of poverty and a vehicle for empowerment. On the global scale, population growth evolves as central policy-making concern of the 1960s, culminating with Paul Ralph Ehrlich's 1968 work, The Population Bomb, focused on "excessive" population growth across the Global South – and within it, poor and rural communities. This emphasis represents the most dangerous pitfall of heavy-handed efforts to reshape how other people live.

Reading your articles[1] *gave me a feeling that technocrats very much influenced India after Partition. Why did postcolonial India in the 1950s embrace a technocratic approach of problem-solving rather than strengthening democratic ways to find bottom-up solutions?*

The direct social intervention demanded by village-centered India envisioned by Gandhi and Tagore appeared to Prime Minister Jawaharlal Nehru and others as a tricky, politically fraught endeavor. In the early years following independence in 1947, the Indian Government laid out multiple options for addressing what it viewed as persistent problems of the rural life. Food production marked a chief concern as India was not yet self-sufficient and the 1943–44 Bengal Famine lingered on the minds of the new nation's leaders. Famine had been a hallmark of colonial rule that independent India rightly sought to abolish. Initially, this work involved a focus on redesigning village life, which addressed the simultaneous problems of refugee resettlement and "rehabilitation" following the chaos of Partition. Into the 1950s, this focus on community development and rural extension programs evolved as a distinct form of nation-building. This work, however, was expensive and returns on these investments were difficult to detect as agricultural yields and economic outcomes continued to languish.

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Whatever the benefits of a reorganization of rural life, they were over-shadowed by the growth-focused solutions offered by industrialization, agricultural mechanization, and investments in massive hydrological projects – all advocated by statistician Mahalanobis and India's first Planning Commission in 1950. Politically, Nehru needed to deliver on his promises of modernization that had grown up uncomfortably alongside a Gandhian vision of independence that emphasized small farming over big industry, the village over the city, and the spiritual over the material. With India reliant on grain imports and manipulative aid programs like the U.S. Food for Peace initiative of the 1950s and early 1960s, the primary concern of the political establishment was to achieve higher agricultural yields as quickly as possible. The scientific work done on wheat in Mexico by the Rockefeller Foundation promised to do just that.

Dr. Jack Loveridge

is a Postdoctoral Research Associate at Harvard University's Weatherhead Center for International Affairs. His research focus includes the role of technology in international development, emphasizing the Green Revolution in post-Partition South Asia.

Why were women not included in the early stage of community development?

One of the major critiques of India's post-partition refugee "rehabilitation" programs and the community development projects supported by the Ford Foundation and others through the 1950s, was that they failed to actively engage women. Nehru himself pointed this out when he visited the model community development township of Nilokheri in the late 1940s. In part, the reason was simply an exclusion of women from meaningful leadership roles. This was compounded by an outsider's understanding of how rural communities should function in northern India.

What should have been done to have a more gender-inclusive policy?

The model advanced for Nilokheri by Surendra Kumar Dey, India's first Union Cabinet Minister for Community Development who had little farming experience and was a U.S.-educated engineer for General Electric, was largely patriarchal – a somewhat limited vision of the family as the core organizing unit of ru-

1 See "Further reading" at the end of this article.

ral life with families centered around politically and economically empowered men. In many ways, this is what Dey considered to be traditional and appropriate. It is also a model the Ford Foundation largely considered appropriate for organizing rural life, a simplistic vision of American rural communities – with men managing farming operations and the business, and women relegated to the domestic sphere. Of course, this limited the impact of such development-focused work as it ignored the economic and political power of women and flew in the face of earlier Gandhian efforts to engage women on a more equal footing with men during the nationalist struggle.

Did the Indian Government recognize the fundamental problems of social and economic inequality at the onset of the Green Revolution?

Through the 1950s and into the 1960s, Indian policymakers certainly paid close attention to social and economic inequality in the context of rural life. At the national level, the social agenda pursued by India's early community development programs sought to address inequality as well – focusing on education, on public health, and on attempting a more efficient application of limited resources. The historian Daniel Immerwahr, who writes skeptically about the community development impulse, refers to this localized focus as "thinking small" and I think that description fits well. At the same time, it was somewhat hypocritical for such an agenda of social change to be targeted almost exclusively at poorer rural communities and to focus less on rectifying urban-rural divides. On a global scale, a portion of the responsibility might also be borne by wealthy nations that benefit from increased food production and urbanization across the Global South. The same thinking could also be applied to policymaking surrounding the heavily subsidized agricultural sectors of wealthier nations. That sensibility is not at odds with development economics, nor does it conflict with market theory – quite the contrary. That could be a broad lesson for thinking about global inequality today.

The primary concern of the political establishment was to achieve higher agricultural yields as quickly as possible.

What were the lessons learned from the Green Revolution for future?

Understanding the scientific and economic underpinnings of the Green Revolution helps to clarify anticipatory thinking on how technologies, even when applied altruistically and successfully, might generate negative externalities for society and the natural world. This is a practical benefit of historical analysis that I think shows its real potential for policymaking, but I don't think that establishing a sort of balance sheet of "good" and "bad" with regard to the Green Revolution is helpful on its own. The real wisdom comes from understanding change over time – processes and repercussions. We learn how addressing one challenge almost invariably generates others. To some extent, technology can adapt to this – we shift away from a reliance on particular pesticides and herbicides or derive ways of restoring the soil and replenishing water tables. Such innovations do not, however, emerge rapidly or spontaneously. These problems endure from generation to generation and become much more acute as economic fortunes decline. They may transform and evolve, but persistent hunger is impossible to address without seriously engaging the issue of inequality across multiple levels of policy.

The real wisdom comes from understanding change over time – processes and repercussions.

The Green Revolution was predominantly successful in Punjab. Why did Indian planners not push it in other Indian states?

The Indian states of Punjab, Haryana, and Uttar Pradesh offered ideal venues in which to deploy the seeds and farming techniques that were the hallmarks of the initial stage of the Green Revolution. The dwarf and rust-resistant wheat varieties developed by Rockefeller Foundation scientists led by Norman Borlaug in Mexico relied on heavy irrigation and large quantities of chemical fertilizers. The former British colonial "canal colonies" of West Pakistan and India's northwest, particularly when augmented by the Indus River Basin settlement of 1960, facilitated by the World Bank, provided the vast amounts of water needed for high yield varieties of wheat to be successful in the mid-1960s. By the harvest of 1968, the region harvested more wheat than could be readily stored or transported. By 1970, Punjab alone was producing roughly two thirds of India's wheat. Further, farmer access to capital and credit with which to purchase new seeds, to mechanize operations, and to invest in chemical fertilizers was certainly greater in Punjab than elsewhere in India during this initial phase of the Green Revolution.

In your research, you had shown how projects funded by international agencies contributed to developing the ground-

work of the Green Revolution. Which message can we derive from your findings on the importance of international development projects to address the current world problems?

The early Green Revolution sprung out of a nascent development discourse, influenced by modernization theories forwarded by experts and policymakers. I think this demonstrates the shortcomings of a top-down, expert-driven approach to food insecurity guided by development thinking. Producing more food would, in theory, end most forms of malnutrition without attending to the more complex problems of meaningful democratic engagement, quality higher education, and broad access to capital. The Green Revolution era defined many of the theories, practices, and institutions still central to international development today, including the WHO. Perhaps most importantly, the agricultural technologies and farming methodologies advanced by the Green Revolution generated human and environmental costs that continue to affect rural communities across South Asia – namely, overtaxed water tables, the extensive deployment of chemical fertilizers, herbicides, and pesticides, and the financial burdens faced by small farmers who struggle to compete with the capital-intensive agriculture.

Following India's independence in 1947, Nilokheri, Haryana rose as an abortive experiment in community development. By the 1970s, the town found itself near the epicenter of the Green Revolution that transformed food production worldwide. *Foto by Jack Loveridge*

So the crucial question is: How to feed a hungry world with minimizing environmental impact? What is the role of technology and what is the role of policy?

This is an agonizing problem with no simple technological solution, but the current crisis necessitates addressing environmental and food security on a cooperative, international level like never before. We have learned from the Green Revolution that simply producing vastly greater amounts of food grains does not in itself end the experience of hunger. Problems of distribution, pricing, and access persist. That tells us a great deal about how scientific and political institutions work, revealing that effective public policy must counter foreseeable risks and adapt to changing circumstances. The complex formula that governs food production and consumption must be constantly and actively reconfigured through proactive policymaking. Still, when it comes to our global food economy, we seem to be able to only buy time. There's no silver bullet to minimize environmental impact while achieving widespread food security, but I do think changes in diet – for instance, shifting away from a reliance on animal-based protein where possible – is a healthy start. Further, reducing deforestation and diminishing mechanized agriculture's reliance upon fossil fuels would help. Still, such solutions are not always cost-effective and may make farming impossible for small landholders and tenant farmers.

Simply producing vastly greater amounts of food grains does not in itself end the experience of hunger.

The current pandemic has stressed food supply chains and food production capacity globally, though we have thus far only seen localized, sector-specific disruptions. Nevertheless, food prices are on an upward trajectory with the emerging problem being one of access and not quantity. The wider economic crisis may well be difficult and persistent, however, limiting the access of the poor and the vulnerable to adequate food, particularly across the Global South. We now run the risk of reduced efforts toward environmentally sound and socially just food production, which may prove disastrous in the long run.

Further reading

Loveridge, Jack (2017): Between hunger and growth. Pursuing rural development in Partition's aftermath, 1947–1957. Contemporary South Asia, 25 (1), pp. 56–69.

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