
A dissertation presented

by

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Abstract

The decades following the catastrophic political disaster that was the Bengal Famine of 1943 saw a radical industrialization of India’s productive countryside and a veritable biopolitical revolution to augment food production that was orchestrated through large-scale, top-down architecture and infrastructure—"quantitative architectures"—that facilitated an emerging monumental landscape. India approached decolonization with quantitative rigor, privileging infrastructure over monumental architectural expression. This turn towards development meant that architecture was caught between, on the one hand, its cultural project—that is, the attempt to synthesize modern and traditional identities—and, on the other, the desire for modernization—that is, the scientific management of peoples and natural resources. This research emphasizes the latter dimension, exploring the aesthetic ideologies that emerged as a result of the urbanization and infrastructural transformation of India’s northwest—the Punjab-Delhi region. It examines how technocrats amassed and produced transnational and hybrid forms of expertise around architectural materials like concrete, steel, and infrastructural commodities like water, wheat, and fertilizer, in the drive to secure the Indian body from starvation. A central argument is that infrastructural and architectural projects, such as dams, warehouses, silos, markets, and universities mediated between a liberal-capitalist pursuit of growth and a bureaucratic model of redistribution. As a result, these projects instantiated a top-down biopolitics, by creating a bureaucracy of norms and standards with which to manage and distribute food rations, thus shaping the distributionist logic of the Third World city.
# Table of Contents

Introduction ........................................................................................................................................ 1

Chapter 1:  
Famine ......................................................................................................................................... 29

Chapter 2:  
Concrete ....................................................................................................................................... 75

Chapter 3:  
Models and Model Townships ..................................................................................................... 122

Chapter 4:  
Growing a Campus to Design Seed ............................................................................................... 171

Chapter Five:  
Bioaesthetic Subjectivities and the Remaking of the Farming Body ............................................ 214

Chapter Six:  
Silo ............................................................................................................................................. 255

Chapter Seven:  
System ......................................................................................................................................... 286

Conclusion ....................................................................................................................................... 329

Bibliography .................................................................................................................................... 334
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Introduction

No man can build or construct anything just beautiful unless he has full faith in him. See the magnificent cathedrals of Europe. People seldom know who were their builders but we do know, because the evidence is there for our eyes to see that the embodiment of faith of the builder is the engineer. So also our great temples and mosques and other buildings. Now we do live in a different age. We do not spend much time on mosques, cathedrals and temples, but in other types of public works. But those public works should also be fine and beautiful because there is that faith.¹

In 1948, Jawaharlal Nehru gave a speech to his irrigation engineers. The speech stands out in the context of the history of architecture and infrastructure. In it, Nehru invoked the beauty of public works in relation to architecture and the laboring body. Taking the epigraph above seriously, this dissertation follows two themes that are central to it—the laboring body and the beautiful public work—in order to investigate modernist architecture, urbanism, and aesthetics in India. This dissertation is framed by Nehru’s regard for the public work. What is a public work? When does it become monumental? How does the public work define and produce the state? And how does the state build public works in the midst of scarcity?

¹ Nineteenth Annual Meeting Central Board of Irrigation and Power, December 5, 1948. Reproduced in Jawaharlal Nehru, Modern Temples of India; Selected Speeches of Jawaharlal Nehru at Irrigation and Power Projects and Various Technical Meeting of Engineers and Scinetists; Commemorative Volume Jawaharlal Nehru Birth Centenary, ed. C. V. J. Varma and K. R. Saxena (New Delhi: Central Board of Irrigation and Power, New Delhi, 1980), 2(d).
The major obstacle facing the Indian state at this moment was scarcity, and throughout the period I study here, scarcity remains the paradigmatic condition through which a political imagination was forged. This dissertation is a history of how scarcity configured a material and political landscape that fundamentally shaped the aesthetics of modernism in India.

While the origins of this story are multiple, the dissertation begins with the Bengal Famine of 1942, when the colonial government’s inability to distribute food to rural Bengal in the aftermath of the Midnapur cyclone led to the deaths of thousands of people. The decades following this catastrophic failure of distribution saw the Indian government industrialize its food sector both to feed a growing population and to organize its agrarian producers. After investigating how the crisis of the 1942 famine catalyzed a shift in the state’s structure of managing food, this project analyzes what I term “quantitative architectures,” which were called in to negotiate the new relationship between the state and the hungry body as well as the new conceptions of nature that these developments precipitated.

Quantitative Architecture

The first part of the title, the Well-Fed Subject, references Reyner Banham’s seminal 1963 work, *The Architecture of the Well-tempered Environment*, and the cue that this project takes from Banham’s work is that architecture’s role in managing the environment and managing the body has had profound consequences for its history in the 20th century. The second part of my title refers to the concept of “Quantitative architecture” refers to the category of design that responded to the technocratic mandate of national planning and technological modernization: agricultural universities, research institutions, wholesale and
retail markets, office buildings, dairies, silos, warehouses, transport networks, housing colonies, and other typologies that housed the extensive system of industrialized agriculture and formed the networks through which food commodities were channeled. The architecture is not one of numbers; rather, it is design for a nation of that conceived of itself through a rational process of modernization. It is an architecture and an aesthetic regime born of an imagination that all uncertainties can be quantified and thus managed, in a technocratic mode outside of political process. Quantitative architecture is an architecture dedicated to producing a decolonized people, legible to the state and manageable by them.

These architectural typologies articulated the state’s instrumental relationship with nature and simultaneously interrogated the fraught categories of culture and identity, which emerged as core concerns in the postwar period. Commissioned by various agencies of the centralized government, the monumental brick and concrete works of quantitative architecture mediated tensions between, on one hand, the utopian state—socially just, unified rather than centralized, technologically advanced, and politically sovereign—and on the other, a technocratic state vulnerable to political pressure in the postwar geopolitical world and unable to dismantle a entrenched nexus of wealth, status, and power.²

Although contemporary architectural historians like Jon Lang see the modern architecture of this period as a device that primarily negotiated the fraught category of identity and attempted to synthesize modernity and tradition, I contend that this architecture cannot be

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² Here the term geopolitics refers to the political economy at the global scale, which spatializes flows of capital, commodities, and expertise as they interact with regulation across national boundaries. Further, it looks at the channels through which political ideas moved across international boundaries and took root in India. John Perkins uses the term “political ecology” to characterize the ways in which Cold War economics and politics played out in the agricultural realm in various places in the Third World. See Perkins, John H. *Geopolitics and the Green Revolution: Wheat, Genes, and the Cold War* (New York: Oxford University Press, 1997).
understood outside of the geopolitical and economic shifts that dictated its programs, materials, construction techniques, and design processes. Raj Rewal’s concrete space frames for the Permanent Exhibition Complex were as much a product of the time’s steel shortage and labor availability as they were symbols of technological modernity. In a prominent instance of the juncture between cultivation and architecture, peasants freed from farm work by industrialized agriculture formed the construction labor for infrastructural and architectural projects. The ways in which the materiality and iconography of concrete and steel construction dialectically responded to international systems of circulation, emerging conceptions of risk and speculation, and new techno-scientific development have yet to be considered in the history of India’s modernism.

Because modernist architects were working for the agencies of the central state, modernist architecture became profoundly tied to the goals of national planning. Planning the growth of the food sector to forestall famine and hoarding forced the country to industrialize agriculture and to develop systems to counter the risks associated with the speculative grain market. Architecture stepped in to provide new visual languages for these transformed systems of cultivation and distribution.

**Approaches to Modernism**

“Modernism,” as an ideology, an aesthetic, and a movement, has been deployed in India in different ways. In its most normative form, it marks the movement through which certain aesthetic trends gained currency within cultural production. This model locates the origin of modernism in the event of the Bauhaus exhibition organized by the Austrian art

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3 Permanent Exhibition Complex by Raj Rewal, 1972, New Delhi. The building’s technological modernity is ironic in that the structure was built entirely by hand-poured concrete.
historian Stella Kramrisch in Calcutta in 1922. The exhibition, which displayed Bauhaus works alongside Bengali art works from the Shantiniketan school, gave modernism currency Calcutta. “Modernism” has also been used to name a response to the developmental state through art, architecture, and culture. This second definition of the concept shifts emphasis from modernism as an aesthetic and formal type to modernism as a critique of political economy.

Nehru, for instance, spoke of Le Corbusier’s Chandigarh as a “place unfettered by the traditions of the past,” which is a veritable definition of modernist imaginations. For Nehru, it was not the physical place but the mind that had to be unshackled from its assumptions. Modernism demanded that the mind bring nothing other than its own capacity to reason to its interpretations of any aesthetic gestures.

Modern architecture in India has primarily been considered a device to negotiate modernity and tradition. Historians such as Jon Lang, Madhavi Desai, and Miki Desai understand architecture in terms of its ornamental and spatial elements. According to the usual thesis, the ties between the ways in which people live and the forms that they construct were severed under colonial rule, and the major thrust of postcolonial architecture was to stitch this essential relationship back together. For Jeffery Chusid, who approaches this history from the perspective of preservation, Joseph Allen Stein enters the modernist theater of India “innocently” and thus successfully integrates structural elements with pre-colonial

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motifs. Art historian Rebecca Brown makes a sophisticated version of the same argument: the central issue in India’s modernist project was the “paradox located at the heart of Indian artistic production in post-independence India: how to be modern and Indian?”

More recently, some historians have studied architecture at the intersection of politics and technoscientific. For example, Vandana Baweja examines the discourses of tropical architecture and hygiene as they manifested in German architect Otto Koenigsberger’s plans for India; she argues that “green architecture” has some roots in European experiments in the tropics. Vikram Bhatt and Peter Scriver contend that architecture represents the state through monumentality: “An illustration of the compelling vitality of modernism in Indian architecture is [Anant] Raje’s sprawling complex of warehouses and wholesale market facilities for the Maharashtra Agriculture and Food Corporation built near Bombay in the mid-1970s.”

But even as the post-independence state focused on public works and infrastructure, it found itself mired in aesthetics—which the state tried to contain through the category of culture. In her seminal essay on cultural creativity, Geeta Kapur argues that the government relegated aesthetics to the realm of culture, assigning culture the task of Indianizing and legitimizing development. But aesthetics cannot be contained within the category of culture. In unruly and wide-ranging forms, aesthetic production spilled out of the boundaries of

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6 Jeffrey M Chusid, An Innocent Abroad: Joseph Stein in India (New Delhi: India International Centre, 2010).
9 Vikram Bhatt and Peter Scriver, After the Masters, Contemporary Indian Architecture (Ahmedabad, India: Mapin ;, 1990) p. 22.
the *academies* into popular art and into popular movie kitsch, which then, through the work of artists like M. F. Hussain and Atul Dodiya, fed back into high art. In cultural criticism and art history there is a long tradition of studying these aesthetic forms, both in terms of how they circulate and how they produce symbolic landscapes.

Finally, some scholars have recently analyzed work produced by “the state.” Work produced by the Films Division and other governmental publicity organizations has been criticized as top-down for its “voice of god” aesthetic. However, this critique falls apart when critics inquire into what “the state” was: the state breaks down into a cast of characters, each of whom acts within certain institutional frameworks but also manifests their own personal narrative. On one hand, the state is a Deleuzian assemblage, overdetermined by all those who ventriloquize it and speak in its name. On the other hand, it is a Lacanian absence—an abyss or a lack that continually erodes its own promise to fulfill its promises. The Lacanian formulation maps onto Gopal Guru’s reading of the state as the continually deferred promise—it fails to deliver in the next instant what it promises in the first. The flip side of this lack or failure is the public works project, which acts as a concrete manifestation of the state. Through public works, the state manifests itself. Public works, however, manifest through assemblage.

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Ranciere’s aesthetic regime includes the distribution of practices that emerge from a political condition. As a result, Ranciere’s aesthetic regime becomes a powerful conceptual tool with which to interrogate the ways in which politics, aesthetics, technocracy, critique, development, and capital interrupt each other to produce an aesthetics that has the possibility of being political.\(^\text{13}\) Given that the state is an assemblage of the various characters who produce it through their practices, these works are part of the aesthetic regime of development. This dissertation traces the various characters who participated in this developmental aesthetic, examining the ways in which agricultural modernization provided fertile ground for thinking through aesthetic modernization.

Grain and the Iconography of Modern Architecture

In approaching modern architecture through the history of modernization and development, my research offers an alternate perspective on Indian modernism. In tracking the built environment’s development as a response to the pressure to feed a growing population, my research makes another theoretical and historical intervention: that modern architecture allied itself with technical fields such as engineering and thus helped define the norms by which bodies eat and live. In doing so, modern architecture adopted the posture of biopolitics and became the concrete means through which the state could instantiate a politics of care in keeping its subjects well-fed.

Why food? Food is both mundane and a central focus for ideological and moral norms. As a result, food was an agent of modernization that had direct access to subjects of the newly independent state. Further, the peculiar modern commodity form of grain—wheat is

the commodity with which I am concerned here—was entangled in the history of modern architecture. One could argue that the “evolution of the formal vocabulary of the modern movement” began with the American articulation of engineering for industrialized agriculture: the silo.\textsuperscript{14} The American grain elevator emerged as a structural response to the United States’ growing outputs of corn and wheat across the nineteenth century. European modernists saw this form as an industrial form that developed from the peculiarities of storing grain: it was both singular and replicable and had proliferated across US farming landscapes. As a figure of the American capacity to innovate, it offered European architects a model for how industrial form could influence architectural thought via the dictum that form should follow function.\textsuperscript{15}

Walter Gropius published images of grain elevators in his 1913 article on industrial iconography, and Le Corbusier borrowed Gropius’s images for his exegesis on the formal architectural quality of mass in \textit{Vers Une Architecture} (1923). However, not until Erich Mendelsohn’s visit to the United States in 1924 had any European modernist actually seen a grain elevator. The visit culminated in his picture book, \textit{Amerika}, which simultaneously celebrated and eviscerated the American landscape as grotesque and primitive. Mendelsohn described grain elevators as delirium transformed to boldness and confusion to harmony. He described their form as “childhood forms, clumsy, full of primeval power, dedicated to purely practical needs”; his photographs of them in Chicago and Buffalo embodied an “expressiveness that corresponds to world consumption”.\textsuperscript{16} The silo’s iconography of


gigantic, primeval, rational monumentality was transmuted into modernity through the writings of Mendelsohn, Gropius, and Le Corbusier. Reyner Banham, in homage to these architects, traced this genealogy of American industrial imagery in *A Concrete Atlantis* (1989). He investigated the material and technological history of concrete elevators, arguing that these “monumental” forms emerged at the intersection of the American political economy and an industrial, ahistorical ethos.¹⁷ In this way, food—and particularly industrially-grown monocultures of cereal staples such as wheat, rice, and corn—came to be at the core of modernist iconography.

Siegfried Giedion, however, articulated an alternate history of the technology that connected man to nature in modernity. His 1948 book, *Mechanization Takes Command: A Contribution to Anonymous History*, tracks the evolution of tools, machines, and other such technological paraphernalia that contributed to the evolution of civilization by accretion. Giedion’s historical archive is Kubleresque in that it treats each object as a response to a specific organic configuration—the hand of the man using it, the nature of the meat it needed to cut. For Giedion, each configuration evolved to solve problems until a fundamental shift in technology created an entirely new set of problems to solve.¹⁸ Giedion charged architects with investigating how architecture might, like scythes cutting grass, evolve into new configurations to mediate man’s changing relationship with nature.

Modernism radically melded industry and monumentality; the essence of industry is pragmatism and the core of monumentality is art, and modernism brought these two opposing

ideas in its formal experiments. Giedion’s approach to the history of technology was shot through with this modernist conflation of the pragmatism and monumentality which proclaimed a new emergence in architecture, one that played out in varying ways around the world. Yet Giedion’s cosmology does not match the postwar world of decolonization and nation building. Frederic Jameson, writing in 1984, looks back to the 1960s as a gap between colonialism and neoliberalism. Arguing that countercultural movements began in the Third World, he puts decolonization and self-determination in dialectical tension with the transforming forces of market capital, claiming that the two responded to each other.

Boltanski and Chiapello, in *The New Spirit of Capitalism*, argue that it is precisely from 1960s nation building that capitalism emerges as an extra-national regime, transcending statist regulatory boundaries to instead operate through specific projects and global flows. These postwar adaptations, argues Neil Smith, forced a rethinking of the Marxist ideology of nature. Arguing that the Frankfurt school’s early critique of capitalism as the human domination of nature was reductive and dualist, Smith contends that Western postwar Marxists began to consider the transcendental category of nature as a result of a complex process of production by man. Capital, argues Smith, dreams of controlling nature, and this impossible dream begins to restructure the production of commodities like grain, cloth, milk, and oil in order to subvert the geographical constraints on cultivation.

Agriculture remained a prime field for techno-scientific modernism. Francine Frankel’s careful study of the Green Revolution traces the ways in which industrial

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19 Jameson marks the failure of the post colonial decolonization project at the point where the Green Revolution entered the Third World. He treats it as a counter insurgency of sorts. Fredric Jameson, “Periodizing the 60s,” *Social Text*, no. 9/10 (1984): 178, 60.
22 Ibid, 91.
agriculture circumvented the political process of land reform: technology was deployed in place of sociopolitical change.\textsuperscript{23} Indira Gandhi’s enthusiasm for a Green Revolution to prevent a Red one echoes Le Corbusier’s ultimatum, “Architecture or Revolution” that modern states could either design a social architecture or face the bloodshed of revolution.\textsuperscript{24} The deliberately anachronistic analogy I set up between postwar agriculture and prewar architecture underscores how both food and shelter promised to create a utopian modernity in the twentieth century. Architecture and agriculture are indices of the modern dream of a just technological regime.

Development and agriculture have largely been seen as political and economic problems that precipitate crisis in the Indian state. Harriet Friedmann has argued that the interdependence of countries in the postwar period’s food regime structured global politics. Friedmann’s story is reflected in India’s technological turn in agriculture. In 1966, India faced a severe shortage of grain that was compounded by Lyndon Johnson’s suspension of food aid to the country. A balance of payments crisis resulted, which allowed the United States, the World Bank, and the International Monetary Fund (IMF) to demand that India adopt a new agricultural strategy with the credit they would provide. Through this series of events, the IMF, the World Bank, and the US forced India to modernize agriculture. In \textit{India’s Green Revolution}, Francine Frankel argues that the economic benefits of technology came at great political cost, were unevenly distributed, and led to income inequality.\textsuperscript{25} Secondly, she contends that the crises of farmers were deeply woven into and leveraged by Indira Gandhi’s

\textsuperscript{24} Le Corbusier. \textit{Towards a New Architecture}. Courier Corporation, 2013, 7.
electoral politics. This complex mesh is the subject of cultural geographer Frédéric Landy, who studies how the political and policy processes of the state interacted with the bureaucratic and spatial parameters of the country’s system of food distribution. In a Foucauldian mode, he argues that the network embodied the state’s territorial anxieties; yet, instead of helping integrate the geography of India, the infrastructural network contributed to the state’s disintegration, laying the foundation for the entry of liberalized finance. Utsa Patnaik, coming from an orthodox Marxist school, argues, contra Landy, that India’s system of public distribution was one of the few models of state-provided social justice, which has been eroded by liberalization. She critiques the datasets that document hunger statistics, arguing that they misrepresent the severity of malnourishment and hunger in India.

Where did the silo fit in modern India’s history? This infrastructural figure of storage has had a different (yet still American) legacy in India’s political economy of wheat from that posited by Banham and Mendelsohn. For post-independent India, storage was necessary to maintain a buffer stock, or a quantity of wheat in reserve that would allow the state to correct any imbalances in the market price of the grain. Thus, silos formed crucial nodes in the state’s management and distribution infrastructure in the years after independence.

Further, networks of silos and warehouses were managed by institutions through which global capital could enter the Indian economy. These institutions were key players in modernizing the commodity of grain. The post-Bretton-Woods world set the stage for the rise

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26 Frankel, India’s Green Revolution. 353-5
27 Frédéric Landy, Feeding India. The Spatial Parameters of Food Grain Policy (New Delhi: Manohar-CSH, 2009), 75.
of neocolonial and neoimperial forces. Capital channeled through the IMF and the World Bank facilitated the Green Revolution first in Mexico and then in India in the 1960s.\textsuperscript{29} These flows of money helped industrialize agriculture in the Third World. Because this process resulted in one of the greatest disenfranchisements of peasantry in history, the Green Revolution proved to be a scientific turn on which capitalist powers transformed erstwhile “imperial control into market penetration.” The history of these networks of institutions, experts, commodities, design, and infrastructure offers an alternate history of modernism in India. Architecture, in this equation, embodied the logic of international capital.

**Scarcity**

Scarcity is a key concept that animated the entire system of agriculture, architecture, and development in India. Scholarly literature written in India and about India the 1950s and 60s is rife with the problem of “scarcity.” But a scarcity of what? Much was scarce in the early years of independence, and only incomplete lists were possible: foreign exchange, wheat, expertise, concrete, fertilizer, irrigation, machines, oil, steel, and so on. Items on this list were not even in the same categories: a commodity like wheat was not equivalent to a resource like oil or a skill like engineering, which would in turn require its own sublist of the particular kinds of expertise that were scarce. Even if scarcity was not conceptually coherent (for instance, there was an excess of population and thus manpower), it was pervasive to the point that it became the defining characteristic of the Indian condition.

This deep paucity became a theme and even an identity in the early decades. As an ideology from a lack of resources, scarcity engendered a particular set of practices and a distinct form of aesthetics. Scarcity, in the technical sense, differs from lack. Where lack

\textsuperscript{29} Frankel, *India’s Political Economy, 1947-2004.*
denotes that something is missing, scarcity is a concept drawn from classical economics, where it functions as a force to which the market responds with an increased price. The price rise in turn induces a replacement for the scarce commodity, either through technological innovation or through substitution. While lack or dearth is an absolute, scarcity is a conceptual tool that renders lack fungible. One commodity can be replaced with another. Scarcity, in other words, is the economic interpretation and translation of lack.

The Developmental State as a Response to the Political Economy of Scarcity

The word “development” is central to India’s conception of itself. Even today, politicians campaign on promises of bringing development to the country. What is development? When politicians use the word in our current neoliberal moment, they mean growth. They mean the expansion of economy and the formal marketplace into India’s semiformal and informal economies. However, this is not what “development” meant in the 1950s; instead, it meant growth plus structural change, to borrow Sukhomoy Chakravarty’s definition. Growth was the domain of the market and of citizens as consumers, while structural change was the domain of the state and the government. This shorthand marks the two poles of development theory, which Arturo Escobar recognized as a new episteme.

Development theory and development economics are founded on classical economics. Development, event in a socialist democracy like India, was an inherently capitalist venture. The market would produce growth, while the state would create structural change. This imagination is laid bare in Walt Whitman Rostow’s influential book, The Stages

of Economic Growth: A Non-Communist Manifesto. The book was reprinted nineteen times in the 1960s.\[^{32}\] Then a professor of economic history at MIT, Rostow posited five stages of growth: (1) traditional society; (2) the preconditions for take-off; (3) the take-off; (4) the drive to maturity; and (5) the age of high mass consumption. It is immediately evident that there is a fundamental difference between the first category—traditional society—and the next four. The next four all proceed from one another, but some structural break must occur between stage one and stage two. Rostow, predictably, theorizes this break as the conditions that set the stage for the Industrial Revolution in Europe. Rostow writes, “Some sixty years after take-off begins (say, forty years after the end of take-off) what may be called maturity is generally attained.”\[^{33}\] This statement reveals how Rostow naturalizes the process of growth and fails to theorize the role of colonialism in helping the First World achieve economic maturity.

Rostow’s stages became part of the language of development in India—for example, Nehru lamented the difficulty of achieving take-off in his speeches.\[^{34}\] The language of this teleology itself was tyrannical in colonizing the imagination of the developmental project. The developmental model was expected to create the conditions for structural change through a planning process—that is, planning was meant to create the conditions in which the economy (which under open market conditions would naturally tend towards maturity) could be artificially moved at a quicker pace from one Rostovian stage to another.

If development was an economic model, what then was the developmental state?

Developmental states were the varied forms of government and the differing institutional

\[^{33}\] Ibid, 60.
setups created in postcolonial and Third World countries to usher in a developmental economy. While development refers to an episteme, that episteme was enacted through a developmental state. Atul Kohli’s *State Directed Development* and Vivek Chibber’s *Locked in Place* study the attempt to create a developmental state in India. Both books focus on planning and industrialization to locate the historical and structural conditions that led to India’s failure to install a developmental state. Kohli, for instance, tries to understand how India failed at both radical redistribution and at capitalism-led industrial growth. The tension between these two different economic models not only persists throughout this dissertation, but also runs through critiques launched at the developmental state in the years after independence. S. R. Dange, in just one example, argued against the tax increases in the 1957 budget because they, though made in the name of social democracy, were neither socialist nor democratic, but instead were an exercise in bureaucratic capitalism.

In the dissertation, I argue that infrastructure became a political technology with which to mediate the differences between the bureaucratic redistributionist model and the capitalist model of growth. Dam building, for instance, became a way for the First World, particularly the US, to export New Deal models of supply-side growth to various regions in the Third World. The First World thus also exported a rational and universal imagination of the landscape to the rest of the world.

In India, a central institution of the developmental state was the Planning Commission. The Planning Commission had its origins in the National Planning Committee which was instituted in 1938, at the behest of Subhas Chandra Bose, as a means of socialist redistribution.

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nation building rather than state-making along revolutionary lines. In fact, this impulse was at the heart of “planning:” to achieve a passive revolution and implement social change without bloodshed. The idea of the National Planning Committee was instantly accepted by the business community, who in 1944 put out their own “Bombay Plan” about how planning should proceed if business interests were to be considered.

The Planning Commission was inaugurated in 1950, when India became a republic. Led by the Prime Minister, the commission consisted of a body of experts who did not hold political office. This provision separated the commission from the legislative branch of government, but Nehru soon recognized that the commission needed some connection to politics in order to implement its plan. In 1952, the National Development Council was created as a non-statutory, non-binding advisory body to the commission; it consisted of the Chief Ministers from all the states and various other representatives.

From Malthusian beginnings to Developmental Ends

This project critiques the developmental state, where life became the subject of infrastructural control under the scrutiny of technopolitical imaginations of nature. Incubated in the last few decades of the British rule, the developmental state was born in the violence of famine, war, and partition. The early decades of independence were marked by the tension between violence and freedom, forcing the government to mediate between the two poles I sketched out at the opening of this introduction: on one hand, a utopian vision of the nation as socially just, unified, technologically advanced, and politically sovereign, and on the other, a technocratic state struggling to take apart entrenched networks of wealth, status, and power and vulnerable to geopolitical pressures in a Cold War context.

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Further, India’s development was besieged by a protracted shortage of food, which attracted Malthusian arguments. Neo-Malthusian ideas emerged as the gene catalyzed a broad Darwinian epistemology of the world. The early decades of the twentieth century mark the ascendance of biological sciences as social sciences; according to sociobiologists, society is the evolutionary end of human as a biological condition. Biologists, especially Karl Pearson, Patrick Geddes, Arthur Thomson, and Lancelot Hogben, came to see the city as an ultimate evolution of the Darwinian human condition. Geddes then took these sociobiological ideas and gave them material form in his surgical interventions into city design, in India, Scotland, and in Israel. As a result, Malthusian imaginations of human population growth were embedded in the critique of Third World urban conditions as near apocalyptic, chaotic, and defined by uncontrollable growth.

Development planning strove to bring about structural changes to and remedy the deficiencies of the biopolitical economy. Nehru’s government hoped to leverage the more robust economy that would result as an apparatus of resistance against geopolitical pressures pushing India in the direction of industrial and infrastructural dependence. Sukhamoy Chakravarty, a developmental economist in the Planning Commission and a key architect of the Five Year Plans, described planning as growth plus structural change. In order to achieve the dual goals of growth and structural change, four areas were seen as targets for quantitative analysis and intervention: population growth, natural resource depletion, capital accumulation, and technological change. Chakravarty’s scarcity is not without a corresponding excess: a scarcity of land was coterminous with a population in excess. These

conditions of scarce resources and unskilled labor, argued Chakravarty, magnified small mistakes into larger problems, and the task of policy was to weigh the risks of these disequilibria—particularly the risks of transitional inequalities.\textsuperscript{40}

Agriculture within this developmental model presented a particular set of problems. The sector was entrenched in social stratification and land reform came to be the primary agenda in the first two Five Year Plans. The Indian approach differed from the Soviet model in which agricultural surpluses were diverted into industry. In India, agriculture would instead be a “bargain sector”—that is, a sector that could, with institutional reform and minimal investment, provide a proportionately large return.\textsuperscript{41} Ashutosh Varshney, writing about shifting political trends in agriculture in the 1960s, 70s, and 80s, argued that this Nehruvian model looked to political reform through various land-to-the-tiller movements. While the Congress Party broadly held control at central and state levels of government in the early post-independence years, this control quickly devolved because the state governments were drawn from the landed classes and provided a serious barrier to Nehru’s land-to-the-tiller schemes. The third Five Year Plan, responding to the failures of the second plan, revealed these fissures. In trying to satisfy both peasant concerns and the demands of the landed classes, the third plan did not manage either.

The failures of these first three plans to address agricultural growth form the context of this dissertation, in that they made Malthusian famine seem inevitable, thus creating conditions which made the technocratic turn in agriculture seem inevitable. The undoing of scarcity relied on biotechnological innovation, belying the lessons of political failure that


\textsuperscript{41} Chakravarty quotes R. Sen’s use of the term ‘bargain sector,’ see footnote 2 Ibid., 21, 24, 94.
came out of the Bengal Famine. As scarcity turned from a political to a technopolitical problem, the aesthetic of scarcity itself began to shift.

**An Aesthetic of Scarcity**

What would an aesthetics of scarcity consist of? I argue that an aesthetic of scarcity became instrumental in the state’s production of itself. The condition of scarcity was transfigured and transmuted into an idea of sovereignty—that is, scarcity defined a relationship of care between the state and the people. The state’s role was to care for the bodies of its people. In addressing scarcity across various political, economic, aesthetic, and technocratic registers, India determined what kind of the state it would be.

In 1952, Nehru penned a letter to his Chief Ministers in which he critiqued ostentation and ceremony in government using the example of a Gandhian conference that he had witnessed at Sevagram. The letter referenced a simple *pandal* (enclosure) made for the conference using bamboo and leaves. Nehru noted that the simple artistry of bamboo and leaves cost very little, a fact that he contrasted to the pomp and ostentation of government ceremony that India had inherited from it British colonizers. Although cost was an issue, Nehru saw this contrast as an equally important question of taste:

> We are a poor country and we must always avoid unnecessary or wasteful expenditure, remembering that it is at the cost of the millions of our people in India. But, apart from the money involved, there is a question of taste and it does not appear fitting to me that some of us should function in a way which is so utterly removed from the conditions in India.

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42 This, and all following quotes from Jawaharlal Nehru, *The Essential Writings of Jawaharlal Nehru Volume 1*, ed. S. Gopal and Uma Iyengar, vol. 1 (New Delhi: Oxford University Press, 2003), 720.

43 A *pandal* (pa.nDAla) is a combination of an awning of posts and cladding (for instance bamboo and cloth) made to create a temporary shelter, under which a large group of people can meet.

44 Ibid. p. 721.
Thus, Nehru, through Gandhi, outlined a moral basis for an aesthetic imagination that he tied both to a contemporary economics of scarcity and to the absolute dearth which afflicted real human bodies—the bodies of “the millions of our people” whose conditions were marked by want. For Nehru, the aesthetic of scarcity was signified by bare scaffolding. Scaffolding appears and disappears much like the labor that scales and inhabits it; it is a temporary architectural element that leaves behind a permanent mass of material architecture. In fact, bamboo scaffolding cropped up repeatedly in images of development, where it signified not only the infrastructure required to make infrastructure, but also the labor involved in building a nation. The metaphor of “building” the nation was not without a referent. The nation was literally built, bamboo by bamboo, rope by rope, and pail by pail, into the future.

In Nehru’s language, the fungible problem of scarcity was tied back to the real problem of lack. Yet this leads us to a perverse aspect of classical economics. An object that is scarce in the marketplace is not necessarily actually missing. Because scarcity and lack are not the same thing: a commodity does not need to be missing in order to be scarce. In classical economics, a commodity might become scarce not because it is not present, but rather because it is in high demand and its price has risen. This dissertation is, at its core, an attempt to understand how quantitative architectures came to bridge the gap between scarcity and lack. It investigates how quantitative architecture mediated the relationship between the liberal economic logic of growth and bureaucratic political logic of distribution. Infrastructure managed the growing food market by absorbing its surpluses and buffering its deficits to distribute food more evenly, in the hope of manipulating and shaping the political economy itself.
Chapters

This perverse logic found stark illustration in a singular event: The Bengal Famine of 1943-44. The dissertation begins with the famine; the first chapter argues that scarcity, a concept borrowed from classical economics, came to be a foundational ideological touchstone for the Indian state. It traces the ways in which the lessons of the famine shaped the landscape and infrastructure of India. The histories of famine and public works in colonial India are inextricable from each other. This is because the famine code required that in conditions of scarcity, the state must declare a public works project to engage peasantry in the labor market as a way of distributing purchasing-power to those who had lost it through the loss of their agricultural output. Thus, both famine and public works were not just events and objects, but also legal considerations: famine is the political declaration of scarcity, and the management of food and labor, through redistribution and public works, renders the public work into more than simply a project, rather, it is also a legal instrument. Thus public works are not simply infrastructural technology but tools of public spending and governance through which the state enacts its promised relationship with its subjects.

The Bengal Famine of 1942 was not declared a famine, and, therefore, was not managed as a famine, but rather as a wartime crisis. The aesthetic interpretation of scarcity was figured through drawings of famine victims. Visuals of dying bodies helped break the silence compelled by the colonial state’s censorship of the word “famine,” bringing news of the scale of rural death to the rest of the country. In drawing the starving body, rendering the slow disappearance of muscle under the skin, Bengali artists like Sunil Janah and Chittaprosad provided a potent visual language that made visible that which was not there: food.
The chapter argues that these images tied the idea of resource and monetary scarcity to the figure of the body, which in turn helped shape the body politic. This was most evident in Jawaharlal Nehru’s argument that Bharat Mata (Mother India) was not land, geography, history, or mythology, but rather the body politic itself. Nehru’s body politic, however, deprived the body of any actual political agency, which is to say that it created a body politic that was stillborn. The chapter argues that the question about what caused the Bengal Famine—shortage of food or failure of distribution?—set up debates that resonated long after independence. Should policy focus on managing the distribution of land, resources, and food, or should it focus on increased production, even if the profits of that productive excess were to fall to a minority of producers?

My second chapter shifts focus from the state of Bengal to Punjab, where the partition of the region had a major impact on irrigation and agricultural output. Here the Bhakra Dam, “a symbol of progress,” was imagined as a technological solution to the many scarcities facing the country. The chapter traces the genealogy of the dam and argues that the Bhakra Dam was important to Nehru because the iconic structure embodied the unity of a laboring nation, a competent state, and technological prowess. Secondly, I argue that in making the dam that state made itself, established a technocratic elite, and created the conditions to deploy infrastructure across its political geography. An important component of this state-making function was the role of concrete, which retooled certain social problems as scientific categories. Finally, I contend that the dam embodied the technomodern aesthetic of India’s political economy. This aesthetic was crafted through representations of the dam in stamps, films, journals, pamphlets, and models. In circulating these representations of the dam
across the country, the image of the dam traveled significantly further than did the power, water, and industry produced by the project itself.

My third chapter examines the use of models in hydraulic research and engineering in the 1960s. Hydraulic research, at this time, had two goals. The first was to expand and upgrade a stunted irrigation network inherited from the colonial state in Punjab, pivoting it towards a modern, managed, and rational system of distribution, and the second was to design and study the aspects of high dams, weirs, barrages, undersluices, canal head regulators, and other hydraulic structures through the use of models. This chapter investigates the Malakpur Hydraulic Research station, located along the Upper Bari Doab canal, which built many models for hydraulic projects. While the working model of Bhakra Lake and the Euphrates River at Habbaniya in Iraq were their most valued projects, the smaller feeder experiments were incredibly valuable in calibrating instruments and testing designs. The drive to hydraulic engineering was tied to the imagination of natural resources as wealth: waterfalls stood for wasted, unharnessed energies that marked the failure of an already indigent state to efficiently use its resources. This attitude towards nature as wasted wealth was linked to India’s inability to participate in the generation of wealth from global trade: because import and export were curbed, wealth could only come from nature and labor.

In this scheme, models represented a material slice of modernity; while projects were continually delayed and downgraded, models performed as proxies. When public works were built far away in mountains inaccessible to the people they were meant to serve, models could circulate as miniature fact. Model making meant that the artisan, the karigar, had to be an engineer and the engineer had to be an artisan. Scientists learnt about nonstructural materials, and artisans had to learn to read survey maps. The model in miniature became a
metaphor of the model state: Punjab became a model for the rest of the country as Bhakra became a model for all other dams. Finally, the chapter turns to township projects built around the Bhakra dam to map the ways in which ideal city plans were inscribed into townships to produce model living conditions in new cities.

My fourth chapter looks at the design of the Punjab University. The University, founded in 1961, marked a turn from the distributive logic of Nehru’s developmental model to the Rockefeller Foundation’s logic of production to stave off global famine. The University itself was part of a modernist movement in Punjab, and the chapter examines how the masterplan and aesthetics encountered and dealt with scarcity. This chapter traces the figurative trajectory of growth through the work of architect Aditya Prakash. Through his experience working under Le Corbusier and Pierre Jeanneret in Chandigarh and for the state government and the university in Ludhiana, Prakash arrived at the metaphor of growth as a primary concern for designers, architects, and urbanists. While working in Ludhiana, Prakash diagnosed the central urban problem as how to manage growth. Growth, which corresponds to the Malthusian imagination of production, marked the ascendance of a productive, liberal ideology over a distributive one. In this chapter, I argue that the career of the architect shows how growth became privileged.

The fifth chapter examines the concept of bioaesthetic planning, the scientific insertion of flora into manmade environments, as a means for reading historical change during the Green Revolution. In this historical moment, we find the Punjab Agricultural University under the aegis of the art-loving phycologist (algae scientist), civil servant, and administrator, Mohinder Singh Randhawa, who experimented with agricultural and aesthetic modernity, transfiguring the commodity of grain and the figure of the peasant along the way. Randhawa,
embedded in an international cadre of expert institutions and state agencies, formulated *bioaesthetic planning* in a state deeply wounded from its violent partition. The concept was meant to anchor rampant haphazard modernization with a moral core of beauty—putatively humanity—with the farmer remade as a modern agriculturalist at the center of this image. This chapter argues that although *bioaesthetic planning* imagined the city as the site of aesthetic change, the theory played out on the bodies of farmers and peasants, as subjects drawn into agricultural modernity in Punjab’s changing productive countryside.

The sixth chapter focuses on storage infrastructure, looking at how silos and warehouses came to be key political technology in the management of food prices. It recounts the material results of the Indian government’s obsessions with creating a buffer stock. In the decades after independence, the department of storage tried to construct warehouses and silos to keep up with the state’s storage needs in wheat surplus towns and at ports across the country.

The seventh and final chapter also examines the creation of the Food Corporation of India (FCI), established in 1964. The FCI functioned as a Janus-faced organization: on one hand, it acted as a market agent in buying grain from farmers at market rates, and on the other hand, in its governmental capacity, the corporation stored and managed grain, setting floor prices and holding vast reserves of wheat and rice in silos and warehouses as a means of influencing the market price of grain at large. The silos built and managed by the FCI were part of a long-term strategy to maintain stable prices in the wheat and food market upon which politics had come to depend.
This chapter thus addresses how infrastructure (silos and warehouses) and institutions (the FCI and the World Bank) acted together to shape the political geography of post-independence India’s food economy. I argue that infrastructural and bureaucratic networks facilitated this Janus-faced institution, allowing the state to manage the intimate commodity of food grains and enact its top-down biopolitics of care. Further, storage was also an infrastructural condition that mediated between a productive logic of the Green Revolution and a distributive logic that came out of famine and the World War II.

In sum, the dissertation brings together a material concern for the body as it came to be articulated by the post colonial state, through infrastructural, architectural, landscape, and design projects.
Chapter One

Famine

The Bengal Famine of 1943, it has long been recognized, resulted from a series of administrative failures and the negligence of a government distracted by World War Two. In their critiques of these failures, communist and nationalist leaders rehearsed an idea that had been developed over the late nineteenth and early twentieth centuries: that the nation, in contrast to the colonial extractive economy, could and should be an ethical and political formation. Their critiques, coming to the fore in the context of preparations for a transfer of power, modeled a possible developmental state. Apart from the political and economic critiques, the famine also provided an aesthetic of sickness to represent the effect of colonial rule. The figuration of the decimated human body articulated by the language of modernism acted as metaphor of the starving state. In the language of Jawaharlal Nehru, the body of the famine victim stood in for the body politic. Alternately, famine also acted as grist for the

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rhetorical mill of technocratic politics. Thus, through art, famine found its way into the very nature of state policy.

An aesthetic of scarcity was articulated through the shock of the Bengal famine. The visual narrative of dying bodies became a crucial agent in breaking the government’s censorship of the word “famine” in the printed sphere and bringing news of the events to the world. Bengali artists—including Sunil Janah, Chittaprosad Bhattacharya, Somnath Hore, and Zainul Abedin among others—developed a potent visual language with which to represent the human body wasting away in the streets and villages of Bengal. In drawing the starving body, rendering the slow disappearance of muscle under skin and flesh melting away to reveal bone, art made visible that which was not there—the commodity of rice. By recording the material effects of the condition of scarcity in which an essential commodity had disappeared from the market, artistic production showed a material concern for the body.

Nehru’s body politic, as many have argued, problematically conflated the Hindu mythical and patriarchal portrayal of India as Bharat Mata (mother India) with his democratic, secular, socialist imagination of civil society. However, in the process of developing a theory of the body politic and in his descriptions of famine as a disease affecting that body politic, Jawaharlal Nehru entangled the abstract, “suffering” body of the state with the malnourished body of the Bengali peasant. A central argument of this chapter is that Nehru’s overdetermined body politic owes a debt to artists’ vivid visual representations of famine.

This chapter makes four claims. First I argue that, in the art of the famine, the body emerged as a material concern for the post-colonial state and, secondly, that Nehru’s body

politic is indebted to the works of Chittaprosad and Sunil Janah. Thirdly, the chapter shows that the famine was simultaneously interpreted in contradictory ways—as a political problem of distribution and a Malthusian problem of production. And finally, I argue that the famine was foundational to a post-independence imagination in which the state’s primary claim to legitimacy was that it did not let its people starve.

The Bengal Famine of 1943

What we now know as the Bengal Famine of 1943 began with a cyclone that hit Bengal’s Midnapur district in October of 1942. The tidal waves that followed devastated coastal farmland, while heavy rains and extensive flooding destroyed property and life. In the wake of this destruction, the aman (winter) crop failed.47 The following months saw the price of rice spiral skyward, quadrupling by March, and by June, rural peasants were dying in the streets of Calcutta.48 Jawaharlal Nehru, then president of the Indian National Congress, chronicled the event in his 1944 memoir, The Discovery of India,

Famine came, ghastly, staggering, horrible beyond words. In Malabar, in Bijapur, in Orissa, and, above all, in the rich and fertile province of Bengal, men and women and little children died in their thousands daily for lack of food. They dropped down dead before the palaces of Calcutta, their corpses lay in the mud-huts of Bengal's innumerable villages and covered the roads and fields of its rural areas.49

The last of many famines under British rule, the Bengal Famine of 1943 stood apart from the others in that it was a wartime famine. In 1943, World War II occupied Britain’s attention and independence was an inevitability. Because of this confluence of conditions, the administrative machinery of Bengal failed to address the scarcities in the countryside through its usual mechanism, the famine code.

49 Jawaharlal Nehru, The Discovery of India (Delhi: Oxford University Press, 1985), 16.
To borrow Nehru’s metaphor of sickness, famine was a difficult disease to diagnose: famine conditions crept into a district slowly, and the effects of scarcity were accretionary. As a result, it took an administration time to recognize that the failure of a crop had resulted in famine-like conditions. Prices would begin to rise. Then families would run out of liquid wealth with which to purchase food. One of the early signs of famine was the constriction of charity, with the result that peasants and the poor left their homes and migrated to urban areas in hope of finding jobs and cheaper food. Kali Charan Ghosh, in an early and significant study of the history of famines in Bengal, presented a list of indicators that were compiled in the famine codes in order to help local authorities discern whether a scarcity of food that could lead to famine-like conditions had emerged.\(^5\) Primary among them was “the wandering of paupers”—the appearance of poor who could not be absorbed by systems of private charity in place.\(^5\) Next people sold off their fixed assets, such as land and jewelry, hoping that would tide them over the period of lack. It was only after this wealth was drained that people began to starve and their fat and muscle withered away, as captured in the iconic images of devastation brought upon Bengali bodies. Each province had its own famine code, and Bengal’s was put in place to address precisely these symptoms.

Famine codes allowed local officials to quickly diagnose famine conditions and provided guidelines for how to intervene with relief. The codes called for the appointment of a relief officer who would make provisions for the bare minimum of food to put an end to “wandering.” In many ways, the codes were brutally pragmatic documents that mandated no

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\(^5\) Kali Charan Ghosh’s *Famines in Bengal* summarizes the different ways in which scarcities and famines were dealt with under the Mughals and the British. The bulk of the book deals with the 1943 famine, outlining various policy and administrative failures on the part of the British government. The book also brings together a collection of images of the famine. Kali Charan Ghosh, *Famines in Bengal, 1770-1943*, 2nd ed. (Calcutta: National Council of Education, Bengal, 1987).

\(^5\) Ibid., 3.
more than minimum requirements. But yet they did exist: there were measures in place to mitigate the effects of drought and scarcities. Many famines were recorded in India, not all as widespread as the 1943 famine; each was on record because the famine code had been brought into action. One of its requirements was that the state declare a public works project to provide relief.

Thus famine and public works were intertwined. Because the administration was adamant that Indians must not “take advantage” of government generosity in the form of free or cheap grain, the government instituted the practice of announcing public works projects in times of distress. Kali Charan Ghosh writes that “on the 28th of March, Sir Arthur Cotton pressed the government for the organization of a great system of public works, but even the government of Bengal denied the necessity of such a scheme.”

Public works became a way to provide employment, circulate money, and keep grain in the market.

Although food was less and less available in the famine-affected districts of Bengal, the government, enmeshed in World War II, did not have the resources to attend to problems at home. Famine was never declared, and thus the code never came into effect. News of the famine was subjected to blackout by the government, and few people were aware of the unfolding disaster outside the city of Calcutta. In the meantime, the effects of famine multiplied: peasants ate their seed and sold their cattle, prolonging scarcities into the next season, while epidemics like malaria and cholera swept over the countryside. Despite this, the people in the cities didn’t know that famine was occurring at all. In The Discovery of India, Nehru recalled:

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52 Ghosh, Famines in Bengal, 1770-1943, 3.
Right up to the last moment, when thousands were dying daily in the public streets, famine was denied and references to it in the press were suppressed by the censors. When the Statesman, newspaper of Calcutta, published gruesome and ghastly pictures of starving and dying women and children in the streets of Calcutta, a spokesman of the Government of India, speaking officially in the central assembly, protested against the ‘dramatization’ of the situation. To him apparently it was a normal occurrence for thousands to die daily from starvation in India.53

Famine appears twice in *The Discovery of India*, which Nehru wrote in 1944, towards the end of a thirty-four-month-long imprisonment at Ahmednagar Fort. In writing this book, Nehru investigated the past in order to grapple with what the future nation of India could become. Famine marked the present and for Nehru, it formed a frame from which he looked back in time. In an important essay in the book, “India’s Sickness, Famine,” Nehru begins with a bold claim, “India was very sick, both in mind and body.” This crisis came at a point when the middle class had been accumulating wealth: “While some people had prospered during the war, the burden on others had reached breaking point, and as an awful reminder of this came famine, a famine of vast dimensions affecting Bengal and east and south India.”54 Nehru wrote Discovery in isolation, from the distance of prison, where he dealt with the effects of imprisonment on his own body and learned about the famine from images in newspapers. For Nehru, famine marked all that was rotting the body of that nation—all that he was attempting to capture in his writing.55

Not until photographs and drawings of skin receding between bones and bodies subjected to starvation appeared in print did the famine begin to acquire the proportions of

53 Nehru, *The Discovery of India*, 496.
54 Nehru, *The Discovery of India*, 495.
55 Pandey writes, “His prison accommodation varied in small points, though he always had a cell to himself, often placed in a barrack or quarter of the prison shared with other political prisoners, who usually irritated him. He resented the loss of privacy: ‘This close association in a barrack had most of the disadvantages of married life with none of its advantages.’ Mosquitoes and bedbugs were an inevitable accompaniment to prison.” B. N. Pandey, *Nehru* (Springer, 1976), 154.
crisis in the popular imagination. Images of the famine were crucial agents in the distribution of news.

Who Lives if Bengal Dies? Art as News

In 1943, the young, culturally-minded Puran Chand Joshi, then general secretary of the Communist Party of India (CPI) and editor of its mouthpiece, People’s War, recruited Chittaprosad Bhattacharya and Sunil Janah to record the Bengal Famine. Chittaprosad, as he called himself, was a self-trained artist from a middle-class Hindu Bengali family who joined the Communist Party and moved to Bombay to pursue his art career. During his college years in Bengal in 1937-38, he encountered the communist movement, and later, through P.C. Joshi, he worked full-time as an illustrator for the party. Sunil Janah, Joshi’s other recruit, also encountered the Communist Party in college. In the wake of the famine, Joshi asked Janah to join him on a tour of Midnapur. Janah, who had to take an exam the next day towards a degree in English Literature, skipped the exam and left to report the Bengal Famine.

Janah’s and Chittaprosad’s oeuvres are separate and distinct. While Janah is considered formative in Indian photography, Chittaprosad’s work has a more complicated relationship with that of other artists in the Calcutta Group; his politics certainly differ from that of the Bombay Group that commanded the modern art scene in post-independence India. As different as their careers and works were, Janah and Chittaprosad intersected in their work about the Bengal Famine for the People’s War. They each also made images that mirrored those of the other, especially when representing party events. In the aftermath of

58 Chittaprosad is also set apart by a career in which he, unlike his contemporaries, stayed continually critical of the art establishment. Rita Datta, “Promiscuity rather than Purity,” Bengal Blues, India-Seminar, 645 (May 2013), http://www.india-seminar.com/2013/645/645_rita_datta.htm.
independence, when Joshi was expelled from the party, the artists distanced themselves from
the CPI as well.⁵⁹

Even though the highest rate of death from starvation occurred between March and
November of 1943, it was not until that same November that the word “famine” appeared in
the Communist Party’s weekly newspaper. The word “famine” was not in circulation because
of the blackout on using it in papers, ostensibly to prevent panic and, even more importantly,
hoarding. (Later, the Famine Inquiry Commission would declare the failure to distribute food
and to manage hoarding to be the etiologies of astronomical price rises.⁶⁰) Before the first
outright mention of the famine, most news articles talked about the difficulties of food

⁵⁹ Joshi is a tragic character; he was tried in the Meerut Conspiracy case in the early 1930s and ascended to
party leadership in his twenties. At 28, he served as the editor of the People’s War. At independence, he
threw his intellectual weight behind Nehru and the Congress, which went against the Soviet wing of the
party. As a result, he was expelled in 1948. As editor of the People’s War, Joshi was key in expanding the
aesthetic sensibility of the Communist Party of India into literature, theater, and art, bringing them together
on a “common liberal-humanist platform.” Sudipta Kaviraj, “Remembering P.C. Joshi,” in People’s
shortages, the problem of hoarders, and the possibility of riots. For instance, in July 1943 an article reported on how peasants overcome by food shortages gathered to attack a ration shop, but instead of resorting to needless violence, turned to political action and formed a committee.\textsuperscript{61} \textit{People’s War} stressed the value of organizing during crisis, which was a key part of the communist agenda.

The \textit{People’s War} was committed to reporting food shortages to demonstrate the vested interests of bourgeois rule, which affected laborers and the rural peasantry disproportionately. The first sign of shortages came from middlemen who purchased, stored, and held grain until prices skyrocketed. The Communist Party saw this tendency to hoard as an instrument of capital accumulation and of the oppression of the peasantry, so their reporting of the famine began with the symptom of rising prices and stories of hoarding. “The Hungry Came to Loot. But stayed to form a food committee” encapsulates the hope of the Communist Party that the mob would become a conscious community, a class. The party’s reporting was an instrument of that will to organize.

In October 1943, Joshi and Chittaprosad departed on an extensive tour of the famine-affected provinces of Bengal. The compatriots began their travel in Midnapur district, which was the district that endured the cyclone, the proximate cause of the famine, a year previously. They traveled through Midnapur, using the party’s network of friends and workers, counting on the hospitality of “fellow patriots” for shelter and food. Upon his return from this tour, Joshi published a hastily produced pamphlet, “Who lives if Bengal Dies?” Simultaneously, he published a special Bengal issue of the \textit{People’s War}; his cover essay,

\begin{footnotesize}
\textsuperscript{61} “The Hungry Came to Loot. But Stayed to Form a Food Committee,” \textit{People’s War}, July 4, 1943, Ajoy Bhavan, New Delhi.
\end{footnotesize}
“Behind the man-made famine,” demonstrated how the conditions of scarcity came about.62 Both essays were illustrated with photographs by Sunil Janah. In the essays, Joshi argued that according to calculations, the food grain deficit in Bengal was only 15%, whereas prices rose 400% or more. He then reiterated that the cause of the famine was a failure of distribution: that is, that the famine was caused by a false scarcity where middlemen hoarded grain in hopes of even higher prices. This view of the famine became the dominant view after Amartya Sen’s economic analysis of it.63 However, the Famine Inquiry Commission (1945) concluded that rural death was created by true lack and not by technical scarcity.64

The center spread of “Who lives if Bengal Dies?” describes conditions across Bengal as much as ascribing a cause and appealing for support (Figure 1.3). Sunil Janah’s photo essay that accompanied the pamphlet consists of four images of Bengali peasants: quitting the village, on the pavement of the city, at the relief hospital, and finally to the ghats (cremation grounds). The photo essay does a special kind of work in this sequence: it not only marks the hopeless downward trajectory of peasants to their deaths, but also tracks the slow emaciation of the body both literally and metaphorically. The first image shows five people: a man, a woman holding a baby, and two young children (Figure 1.2).65 There are two people in

64 ‘There is no doubt that shortage of supplies was a basic cause of the famine. We can put this in another way by saying that, if the aman crop had been a good one, the, famine would not have occurred. With regard to the conclusions stated above about external supplies of rice and wheat, the non-availability of such imports during the period in question was a much less important factor in the causation of the total shortage than the failure of the aman crop and the depletion of reserve supplies. It was, however, an important factor in creating and main•• taining a tendency to a rise in prices. Famine Inquiry Commission, Report on Bengal. 77.
65 Although the images in the newspaper are not credited, they can be found in Janah’s collection of images of the famine. Also, Janah was the official photographer hired by P. C. Joshi, and so it is quite safe to assume that most of the uncredited images of the famine appearing in the pages of the People’s War were taken by Janah. See Janah, Photographing India, 145.
the second image: a woman and a child lying on a pavement in embrace. The third image shows one person in a hospital cot, and the final image of a cremation pyre is simply empty. The photos, in the stark black and white of newsprint, emphasize the recession of skin between ribs—particularly the first one, where the ribs of the bald child on the right protrude from his body and catch the light like white streaks rising out of his sepia-tinted skin (Figure 1.2). 66

Figure 1.2. A Muslim peasant family leaving their village, Chittagong, East, during the Bengal Famine, 1943.

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66 One of the most enduring images of famine and empire appears on the cover of Mike Davis’s *Late Victorian Holocausts*. The photograph, taken by a missionary in 1877, is cropped to frame four emaciated people who stare straight into the camera. The image is powerful, perhaps because of the way in which the ribs, arms, and cheekbones of the victims protrude and catch the light. Photography’s capacity to starkly underscore the loss of flesh between ribs results in the archetypal image the famine victim—one that is particular to South and East Asia, where men frequently do not cover their upper bodies. This archetype emerges at the confluence of colonialism, photography, and famine. Mike Davis, *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (New York: Verso, 2001), cover, 52.
Janah’s pictures encompassed almost all the categories of images that come out of famine: the starving body, the dying body, and the dead body. The one type that is missing from this photo essay is the waiting body or the body in queue. Each iteration of these categories marks out the body as the central problem in this war-encumbered colonial moment. Photographing the famine was Janah’s first major project. It brought him to politics in Bengal in a way that transformed his life. Although he was enrolled at the university, he never took the final exam, “having been swallowed up, instead, by the communist party.”

Janah’s early work needs to be considered in light of the theoretical problems of photographing different kinds of violence as well as in the context of photography’s historical role, beginning in the mid-nineteenth century, of producing a record of acts of violence.

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67 Janah, *Photographing India*, 12.
perpetrated upon bodies. While these images did not show combat itself, Janah’s famine photographs captured victims of the economics of war, in which grain diverted into war coffers left the countryside in a state of starvation.

Chittaprosad, who also traveled with Joshi through Bengal, returned and published his drawings and writings first as a book, *Hungry Bengal: A tour through the Midnapur district by Chittaprosad*, and later, as individual essays in *People’s War.* Chittaprosad’s drawings, in the tradition of social realism, straddled a fraught line between documentation and critique: these images both record the famine and emerge from it as politically engaged art that denounces the violence of imperial-capitalist accumulation.

The text of Chittaprosad’s first publication, *Hungry Bengal*, reads like a series of unedited diary entries with descriptions of each mile and each encounter: “Next morning we were again on our way before the sun was up. Four more miles had to be covered. We offered to carry the child in our arms but he refused obstinately.” Like his images, his text is raw, urgent, and present. It feels unedited—that is, unmediated—just as the drawings themselves were required to feel like authentic documents of the event of the famine, as if the encounter with death and starvation had passed through the conduit of Chittaprosad’s body, without alteration or the filter of his particular perspective, to the eyes of his viewer.

The book contains drawings from both the village and the city. Of the city images, one that represents the theme, “Gods Change Hands,” rehearses the not-too-subtle double meaning of this phrase. On one hand, people literally sold metal idols to acquire money for

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food, and, on the other, gods metaphorically shifted their allegiance, “deserting their poor votaries and going to the abode of the faithful—that fat bellied Hindu merchant.”

*Hungry Bengal*, published in Bombay, was confiscated by the authorities, and all copies were burnt. Only two remain: one that was kept by Chittaprosad’s family and another that was deposited in the British archives. Chittaprosad deployed social realist strategies to convey immediacy, and these famine drawings are situated within his larger oeuvre of printmaking. His other strategies involved locating the images geographically and providing a narrative for them. The sketches themselves were usually accompanied by detailed notes on the reverse side of the page. The images, like the text, are urgent sketches—not realist, but not abstractions of bodies either. Mallik, art historian and Chittaprosad’s primary biographer, has called this style the “linguistic code of an abbreviated realism” (Figure 1.4). Mallik argues that the pen and brush sketches operate as a mode of social realism, but have usually been read as documentary news images.

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69 Chittaprosad, *Hungry Bengal*, unpaginated.
71 Ibid., 30.
Contentions that Chittaprosad’s art was either too overtly political or too simplistically realist have posed a problem for his historians, who have attempted to parse his “coded” realism, thus distancing it from documentary. For example, Mallik writes, “Chittaprosad guided his pen and brush to pick out the requisite details—the lines of the forehead, the folds of unkempt dress—such details in which the broken nervous jerk characteristic of the linear stroke generated a sense of pathos in the person’s expression.”

Mallik’s insistence on pathos and urgency as formal transmutations of crisis embody his attempt to repurpose evidence that the images are “documentary” to instead show how they use aesthetic strategies. For Mallik, that which audiences have read as urgent distress was coded to perform exactly that function: “Not only is anxiety and worry coded in the gesture of

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Figure 1.4. A page from the only surviving copy of the self-published *Hungry Bengal*. Chittaprosad Bhattacharya, *Hungry Bengal* (Bombay, 1945; reprinted in facsimile by DAG Modern, New Delhi, 2011).

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a man resting his head upon his hand, but it is spelt out in the resigned slump of the figures and in the rough and wrinkled lines that outline the forms."

Figure 1.5. Ahmed Ali Molah. Chittaprosad named his subjects, marking their identities as a strategy to resist the artistic production of a generic body.

Mallik argues that Chittaprosad’s images of death are “more penetrating” than the others, specifically referring to an image of a body being eaten by a dog while vultures wait in the background (Figure 1.6). On the contrary, I argue that his images of death are less powerful than those of the living. Chittaprosad’s images stand firmly against abstracting a person into a generic human body. He anchors any representation of someone’s body that could be seen as a generic body, wasting away, back in the reality of that particular person, in

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73 Ibid, 30.
74 Ibid.
that particular village, who suffered from specific conditions, such as prostitution, malaria, or small pox, rather than “famine” (Figure 1.5).

The second to last image in *Hungry Bengal* is effective because of Chittaprosad’s strategy of naming: “His name was Kshetramohan Naik” (Figure 1.6). The text that accompanies the image came from an anecdote in the diary in which a malaria victim’s body was carried to the crematorium, but before the pyre was lit, a fever overcame the mourners, who left immediately. As a result, his body was later found being fought over by vultures and dogs. The image of this body was not one of generic death, yet it was also emblematic; as Chittaprosad writes, “Kshetramohan’s fate was not unusual in any district of Bengal today.”

![Figure 1.6. Left, Sunil Janah, Corpse. Right, Chittaprosad, “His name was Kshetramohan Naik,” Hungry Bengal.](image)

This image, as Mallik points out, bears a very strong resemblance to Sunil Janah’s photograph of a dog eating a corpse. The two images reflect each other. Janah’s and Chittaprosad’s trajectories of image production intersect to mark the point where image making during the famine breaks down because all starved bodies begin to look the same.

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75 Chittaprosad, *Hungry Bengal*, Plate no. 19.
What are the ethics of drawing the dead? Both Janah and Chittaprosad clearly struggled with this problem, Janah even more than Chittaprosad. Holding his technological apparatus up to their misery, Janah felt far more intrusive into the lives of those suffering. Distressed by the experience of photographing the famine, he chose a different photographic subject entirely after he left the party. After shooting the violence of famine and of partition, he left “political photography” to retreat into “the primitive,” photographing Adivasi women and men in the tribal regions of India.76 This act of photographing the primitive, writes Partha Mitter, falls into a larger thematic shift in which artists in India, especially Tagore, recuperated “the primitive” within modernity as a critique of both nationalism and industrial modernization.77 Janah revealed a certain conflict in photographing the dead and the dying, which requires a closer look at ethics in photography. How can we develop a theoretical position in response to the rather problematic set of images that emerged from rural and urban Bengal?

Chittaprosad’s work itself occupies a complicated category: it is not photography and it needs to be defended from being dismissed as “documentation” and rather, it needs to be taken seriously as part of the social realist tradition. Yet the party itself promoted the images as “authentic,” describing them as “sketches drawn from real life, of what he had actually seen in the villages and towns of Bengal,” and thus as containing a weight of accuracy coterminous with photography.78 The urgent strokes are used as evidence that the artist was only a vessel that carried the message from the countryside to the eyes of the viewer. The

76 “Taking photographs of the famine had been a distressing experience, but it had strengthened my cherished desire to photograph people in the villages as they usually are, not when they are under such a grim shadow.” Janah, Photographing India, 23.
78 “Bhooka Bengal Exhibition,” People’s War, January 9, 1944, Vol 2 no. 28., p. 3.
imbrication of Chittaprosad’s images with photographs becomes doubly urgent considering that the publication of photographs was instrumental in raising awareness and concern about conditions in the countryside. The ethical content of the photographs is embedded in their capacity to transmit the plight of rural Bengal to the rest of the country.

In his work, Chittaprosad had to both bear witness to the horrors of the famine and use formal strategies to convey those horrors and move an audience to political action. Both purposes required an exaggeration of line, but also a careful excision of any allusion to an aesthetic excess. As with photographing sites of tragedy, the challenge is not to aestheticize situations of destruction because audiences cannot tolerate aesthetic excess in this context. Image making is caught in its own bind—that is, it must disguise its formal concerns in realist strategies to avoid an intolerable aesthetic excess in representing suffering.

Mukul Kesavan argues that photographer Raghu Rai’s “credo”—to use the frame of the camera to cut out a slice of the world—is the “equivalent of social realism.” Kesavan describes this approach not only as a faithful representation of the world, but also as an almost animated slice of reality: “if he were to put [the image] back again, life and the world would begin moving again without a blip or stutter.” Rai argued against a “sterile pictorialism,” and he counseled younger photographers against the romance of painterly styles. For him, social realism stood against the picturesque as a visual instrument with which to apprehend the landscape. Rai’s philosophy is valuable in the context of the famine because he acknowledges few precursors, among whom Sunil Janah looms large.

**A Theory about Fragments**

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80 Ibid., 31.
“I was quite excited in discovering this little fragment of a human being in a lone field, dark and gloomy as a graveyard.”81

Although the Bengal Famine was not active combat, it resulted from the economics of World War II and so represented the backyard of war. In making images of decimated bodies and corpses, the artist could not but participate in the cultural conversation on war photography. Janah’s photographs were published in a newspaper with ‘war’ in its title, and, moreover, there was a world war on. While peasants were not killed by actual bombs and bullets, the economy of the war was at the heart of the Bengal Famine. Both the war and the famine afforded a certain class the opportunity to leap upward into the middle. Artists who documented the famine borrowed wartime language, reporting from the “frontlines.” Thus I argue that these images can be read as a subset of wartime image making, and I borrow from wartime photography to understand these images.82

Chittaprosad illustrated this double offensive of war and famine on the bodies of the children on the front page of People’s War on November 21, 1943: a fat hoarder with wings (an angel of death?) rides a rocket bomb, looking down gleefully at four swollen, hungry

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81 Chittaprosad and Delhi Art Gallery, Hungry Bengal, Plate no. 17.
82 When speaking of the history of war photography, the question that must come second is which war, because the technologies of both warfare and image making changed significantly from the American Civil War, the Crimean war, and the 1857 mutiny to World War II, World War II, and so on. Colonial territorial conquest went hand in hand with the expansion of photographic technology, and, as a result, large numbers of exotic photographs of the tropical world were produced simultaneously with the violence of conquest. Mary Warner Marien quotes Samuel Bourne’s comment that the Himalayas are not picturesque and paraphrases Mark Howarth-Booth’s discussion of how photographers attempted to aesthetically manage the landscape by imaging it using picturesque framings. Mary Warner Marien, Photography: A Cultural History, 2nd ed (Upper Saddle River, NJ: Pearson Prentice Hall, 2006). Zahid Chaudhary splices these images of colonial conflict with the anthropological documentation of foreign bodies, arguing that the images themselves acted as commodities with phantasmagoric content, and further, that this alienated phantasmagoric commodity gaze was imposed onto the colonial other as a form of governmentality. Thus the legacy of war photography is twofold: the creation of heroes in the battlefield and the domination of people in the margins. Zahid Chaudhary, “Phantasmagoric Aesthetics: Colonial Violence and the Management of Perception,” Cultural Critique 59 (2005): 63–119.
children who wait to be shattered into pieces (Figure 1.7). Accompanied by Joshi’s essay, “Are the Japs Coming?,” the image represents the double threat of war and greed and asks which will claim its victims first. This is one of Chittaprosad’s few images of the famine that has a caricaturesque quality and provides commentary on the economics of famine, rather than rendering of the bodies of those it affected.

Figure 1.7. Chittaprosad, “Are the Japs Coming?” People’s War, November 21, 1943.

Chittaprosad resisted fragmenting the bodies of his subjects: by retaining their names and stories, he tried to present the whole human in possession of a dying body. He used fragments to structure a narrative outside of the image. The frame and the fragment that it contains, Linda Nochlin has noted, suggest a world beyond the lines of the image—an

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83 Puran Chand Joshi and Chittaprosad Bhattacharya, “Are the Japs Coming?,” People’s War, November 21, 1943, Ajoy Bhavan, New Delhi.
unknowable outside that shapes the inside.\textsuperscript{84} The framed fragment allowed Chittaprosad to maintain the humanity of his subjects while also using the frame to cut their bodies off, as a strategy to inscribe violence into his images and represent the violence of famine and war on their bodies.

Consider the 3rd plate of Hungry Bengal, entitled and signed Bowbazar St. Calcutta Chittaprosad 26 Oct (Figure 1.8).\textsuperscript{85} The text printed beside it reads, “on the pavement …the five corpses that I counted one morning in the short stretch of the road.” Structured a set of contrasts, the image is bisected by a diagonal line that separates the pavement from the road. The pavement occupies the greater part of the image and foregrounds five figures—alive, not corpses—on straw mats. Above them, in the fragment of the street, is a fragment of a pulled rickshaw and one muscular calf of the person doing the pulling. Two feet of the passenger in the rickshaw and the wheel of the contraption itself are also visible.

\textsuperscript{85} Chittaprosad and Delhi Art Gallery, \textit{Hungry Bengal}. 

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The fragment at the top of the image is animated by motion and, even more importantly, by the capacity for motion: the capacity to pay someone to pull you around the city, the capacity to sell your physical labor, and the muscular ability to pull. The muscles in the leg are drawn in sharp contrast, with brush and ink—the same technique Chittaprosad uses to highlight the lack of fat and muscle, the skin and bones, of the “corpses” in the lower half of the sketch, where five people sit on bamboo mats. Their entire lives, ostensibly, are contained in that small swath of ink: their utensils, clothes, beds, and, last of all, their bodies. Chittaprosad’s language of the body, responding to Soviet traditions of social realism, can be thought of as an inversion of the Soviet celebration of the musculature of the laboring body.\(^\text{86}\)

\(^{86}\) Rajashri Dasgupta defines the aesthetic task of realism this way: “to produce an art that was, above all, factual and documentary in nature, instead of mythical and narrative.” Rajarshi Dasgupta, “The People in
While continuing the artistic work of “memorializing the subject,” Chittaprosad reverses the image: the exaggerated lines of the ribs, legs, and bones invert the celebration of the muscular, working body. The fragment of a muscular leg in the top of the image emphatically underscores this aesthetic inversion.  

While social realism was an aesthetic strategy with which to elicit an affective response in an audience at some geographical and economic distance from the crisis at hand, it was also a political reference. Social realist aesthetics aligned Chittaprosad’s work with Soviet communism in its appeal to affect. 

While some of Chittaprosad’s images work as fragments, he also made images of fragments, which are fraught in their own way. Most crucial is the image on the final page of Hungry Bengal (see figure 15), where pieces of a bones, a femur, some ribs, and vertebrae surround a skull, gently resting in grass. This final image, which mirrors the narrative of Janah’s photo essay, underscores the effacement of the body. It is almost as if the destructive force of the famine is greater than Chittaprosad’s resistance to fragmenting the body, and so the skeletal remains are presented as a coda. As soon as the fragmented skeletons come into the frame, the names and stories disappear. They become the generic dead, or a metonymic offering for all the dead. 

87 Christina Kiaer argues that “this lyrical strand of Socialist Realism was an attempt to rework modernist aesthetic strategies to help viewers to feel, as well as to comprehend analytically, the meanings and promises of socialism.” Christina Kiaer, “Lyrical Socialist Realism,” October, no. 147 (Winter 2014): 55–77.  
88 Chittaprosad and Delhi Art Gallery, Hungry Bengal, plate no. 20.
The fragmented body represents not so much death as the breakdown of the moral economy, as recounted by Paul Greenough. What is lost to the foreign spectator is that a body is never left without last rites. The presence of skeletal bodies refers to a broken down set of social networks, where there is no opportunity for the cremation and ritual completion of the life of the body. The problem with a lot of the later work that came out of the famine was that each body became a generic body; when Greenough critiqued modernism and the Calcutta Art Group for not producing a critical art practice during these final years, it resonates with the conundrum of the generic body. Chittaposad’s art is very much a representation of these intertwined problems: the breakdown of the social capacities of the village and the subsequent dehumanization of the rural body (Figure 1.6).

The Body in Queue

Figure 1.10. Sunil Janah, orphans waiting for food at a famine-relief center during the famine in Orissa, 1944.

In January, some months after Chittaposad returned from Calcutta to Bombay, the Communist Party put on an exhibition which brought together Janah’s photos, Chittaposad’s drawings, and some cartoons by two cartoonists highlighting the politics and bureaucracies

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underlying the famine. The show, *Bhooka Bengal* (Hungry Bengal), as recounted in an article in the *People’s War*, was divided into three parts. The first consisted of Janah’s photographs, a series showing “lakhs of starving peasants from the villages to Relief Kitchens and from there to the cremation ground,” a trajectory that resonated with the “Who lives if Bengal Dies?” photo essay. The second section featured Chittaprosad’s sketches, “drawn from real life of what he has actually seen in the villages and towns of Bengal.” This framing emphasizes the authenticity of the images and presents them as analogous to photos, which were already imagined as indexical, documentary pieces of evidence. Joshi’s piece lauded the crowds that arrived despite the lack of publicity, “Queues had to be formed and a double stream of incoming and outgoing humanity was seen at the Red Flag Hall.” In the drawing that accompanies this text, Chittaprosad presents a bird’s eye view of men in queue, waiting to inspect the images on display (Figure 1.11). This drawing mirrors the last category of famine images: the waiting body, the body in queue.

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90 “Bhooka Bengal Exhibition,” *People’s War* 2, no. 28 (January 9, 1944): 3.
Images of the waiting body were a consistent feature in the newspapers. In August of 1943, the *People’s War* showed a row of people sleeping on a footpath with the dramatic headline, “queues of death” (Figures 1.10, 1.11, and 1.12). The headline’s metaphor implies, of course, that people were waiting in line for death, but other images reveal that this was indeed a queue for something more concrete. People would queue up outside relief kitchens, waiting for them to open. Some people would queue up for the distribution of cloth, and others for rice.\(^9\) This waiting body would later become one of India’s most visual markers of lack, as the queues outside ration shops figured in some of the most widely circulated images of shortage.

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By waiting in public space, the body’s presence marks a lack or a scarcity. It marks that which is not there. It inverts the absent and makes it present through the presence of the body—which itself was in the process of disappearing. Waiting in the street and dying in the street constituted a political act that forced the state to see that death.

Chittaprosad continued to publish drawings of famine victims in the *People’s War* through 1944. In the first half of the year, the images are those of rural peasants at relief hospitals in the city. But in the second half of the year the images return to the districts outside Calcutta, reflecting another trip that Chittaprosad undertook in June and July. On this journey, Chittaprosad went to various villages, producing a series in which he presented images and text from the home villages of people well-known and active in the freedom struggle. For example, the December issue carried the full page essay, “Life Today in the Village of Jagadish Chandra Bose.”92 Again, here we see another strategy Chittaprosad used to make the village more present in the city and to draw readers into the lives of the peasants. The famine affected the rural poor disproportionately, as recounted by Greenough and Sen and verified by the experience of people in Calcutta. The government kept prices artificially low in the city, where grain was only sold by licensed dealers. Grain flooded to the city, leaving the countryside deprived of all food.

Chittaprosad’s thick descriptions offer what one might describe as an ethnography of rural Bengal, one that is perhaps the only document of the subaltern peasant affected by the famine. And in this regard Chittaprosad’s documentation of the famine is in contrast to Nehru’s reading of the body politic. Where Nehru would read famine as the body of the state dying, Chittaprosad responded to the body politic proleptically with his images—as if to say,

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92 “Life Today in the Village of Jagdish Chandra Bose,” *People’s War* 3, no. 25 (December 3, 1944), 12.
it is not the state that is dying, it is the body, this specific rural body. The bodies in their expressive detail are not allowed to become topologic sites upon which the colony is exchanged for a democracy.

While images performed the instrumental task of spreading information about the famine, they also did the less immediate work of providing a potent metaphor for the body of a nation under the thumb of colonialism, as articulated in Nehru’s descriptions of famine. The work of artists produced in this moment has been seen as largely operative by their contemporaries and by their historians. It was work done early in their careers, and there was still a large amount of engagement with the world left.

Figure 1.12. Sunil Janah, women queuing for rice during the Bengal Famine, Lake Market, Calcutta, 1943.

Although Chittaprosad’s work stands firmly at the beginning of the “Calcutta Group,” this group never found the fame that the subsequent Bombay group found. Rita Datta recounts the various crises in Bengal that led to the formation of the Calcutta Group—the famine, World War II, Tebhaga riots, partition, independence. She talks about how history has consigned these artists to the fringe of mainstream production.93 Partha Mitter, in his

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93 Datta, “Promiscuity rather than Purity.”
introductory note in the Chittaprosad retrospective, recalls how Chittaprosad described other artists as “apolitical,” his scare quotes indicating that Chittaprosad’s understanding of politics was naïve. Mitter allows that rather than a doctrinaire pictorial language, Chittaprosad employed a “broad humanist agenda.”94 Paul Greenough argues that one of the tragedies of the famine was the lack of art that came out of it. He calls the cultural production of that moment more documentary than artistic.95 Datta, however, argues that Chittaprosad’s later work transmuted the early political wounds into philosophical wounds.96 Partha Mitter’s foreword in the retrospective seems a bit disingenuous in describing Chittaprosad as a “socially committed graphic artist” in order to separate him from the politics of modernist abstraction.97

Theorizing the Famine

The Bengal Government instituted the Famine Inquiry Commission in 1944 to investigate the causes of shortages and the subsequent epidemics that took place in Bengal. Contrary to all the evidence of administrative mismanagement, the commission declared that the famine resulted from food shortage due to the failure of the aman (winter) crop of rice, compounded by the loss of imports from Burma. The commission argued that the Bengali countryside operated with little to no margin of safety; that is, it functioned in conditions of low nutrition and high prevalence of disease—factors that were exacerbated in famine conditions. These conditions, stated the report, caused the machinery of trade to fail and led to hoarding of any surpluses, which disappeared from the countryside. The commission

94 Chittaprosad et al., Chittaprosad, 1915-1978, 13.
96 Datta, “Promiscuity rather than Purity.”
97 Chittaprosad et al., Chittaprosad, 1915-1978.
presented shortages as the primary motivator of the failure of the rice market. This proto-
Malthusian argument, in which shortage was considered the primary driver of crisis, was
fundamental in laying the ground for the rise of neo-Malthusian points of view.

The Bengal Famine took place at the cusp of the postwar population boom; it was
one of the major food-related events that coincided with the rise of both neo-Malthusian
thought and green revolution technology. Thus, when neo-Malthusian scenarios came to
dominate discourse surrounding the third world in the 1970s, economists like Amartya Sen
turned back to the Bengal Famine to illustrate the deficient nature of the Malthusian
Deprivation*, as a report on the causes of famine for the World Employment Programme of the
International Labour Organization. In it he argued that the cause of the famine was “shifting
exchange entitlements”—that is, the capacity for a laborer to exchange their labor for, say,
rice. Sen argued that it was not the decline of food availability that caused a famine. Rather,
famine occurred when inflationary pressures made it impossible for those at the bottom of the
ladder of wealth to afford food, while those at the top were still able to buy food and eat
comfortably. One motive for this argument was the experience Sen had with the Bengal
Famine itself—or rather, his lack of experience with it. Sen, who was a child living in
Calcutta at the time of the famine, was struck by how little affected members of his family
were by this supposed shortage of food.

(I knew of no one in my school or among my friends and relations whose family had
experienced the slightest problem during the entire famine; it was not a famine that afflicted

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98 Sen, *Poverty and Famines*. 
even the lower middle classes - only people much further down the economic ladder, such as landless rural labourers.)

This experience led him to investigate how famine could affect one group of people living amid another who were not affected at all—that is, famine could differentially target a population. This view contributed to Nehru’s descriptions of the paradox of modern India’s body politic:

India, it is often said, is a land of contrasts, of some very rich, and many very poor, of modernism and medievalism, of rulers and ruled, of the British and Indians. Never before had these contrasts been so much in evidence as in the city of Calcutta during those terrible months of famine in the latter half of 1943. The two worlds normally living apart, almost ignorant of each other, were suddenly brought physically together, and side by side. The contrast was startling, but even more startling was the fact that the people did not realize the horror and astonishing incongruity of it and continued to function in their old grooves.

Sen’s work was preceded by the work of Paul Greenough, who argued that the famine disrupted the “moral economy” of the countryside—that is, it broke apart social networks of reliance and support, which in turn, profoundly altered the social economy of Bengal’s rural areas. The milieu of the late 1970s and early 1980s saw historians and economists turn back to events like the Bengal Famine to argue against the dominant Malthusian narratives. These Malthusian narratives, however, took on a life of their own, culminating in the apocalyptic imagination of a dystopian future that undergirded technocratic interpretations of the countryside. In the next chapter, I discuss this imaginary future, which I call Famine 2.0, as it becomes a fundamental driver of agricultural research and modernization.

Bharat Mata and Nehru’s Body Politic

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100 Jawaharlal Nehru, The Discovery of India, 497.
Nehru argued that famine itself was not a sickness, but rather the devastating symptom of a greater ill that had besieged the body of the state. Nehru first articulated the idea that famine signals greater infirmity in a letter to a British famine officer, who had written asking for donations for famine relief for the Gonda people in 1929. In his letter, Nehru theorized famine and imperialism:

In the face of appalling catastrophe, as in the case of a critical illness, immediate relief measures have necessarily to be undertaken. But you will no doubt appreciate that such measures have a temporary significance only. They neither cure the disease of the social group, nor of the individual. To find the remedy you have to search for the causes of the distemper and to remove them.102

Nehru argued that while we may deal with the symptom of famine through relief codes, to address the cause we must root out colonial rule. Nehru’s continuous movement between famine as crisis and famine as metaphor allowed him to slide seamlessly between the starving body and the ailing state.

No one knows of the many more millions of emaciated boys and girls and little children who just escaped death then, but are stunted and broken in body and spirit…Yet rich England, and richer America, paid little heed to the hunger of the body that was killing millions in India, as they had paid little heed to the fiery thirst of the spirit that is consuming the people of India.103

Here Nehru uses “spirit” in a contradictory way. In the first instance, “spirit” describes that which is destroyed even when the body survives violence; in the second instance, he uses it to describe what survives when people (the body politic) are subjected to colonial rule. What is this “spirit,” whose fate hung so delicately in the balance between fire and destruction? In the

102 The officer pitted Nehru’s politics against his humanitarian concerns: “Prominent members of the Congress are collecting funds to save from prison 31 alleged communists at Meerut. Will you not do the same to save from famine five lakhs of hungry men at Gonda?” Letter dated 26 June 1929. Jawaharlal Nehru, The Essential Writings of Jawaharlal Nehru, ed. S. Gopal and Uma Iyengar, vol. 2 (New Delhi: Oxford University Press, 2003), 11.
103 Nehru, The Discovery of India, 17.
next passage, Nehru moves seamlessly from the body and spirit of the person to the “body and spirit of the state:”

Above all, the Governments of China and Eire, poor in their own resources, full of their own difficulties, yet having had bitter experience themselves of famine and misery and sensing what ailed the body and spirit of India, gave generous help.104

With every seamless slide from the body of a victim to the body of India, or from the spirit of a person to the spirit of the country, Nehru built and buttressed his argument for India’s body politic as its claim to nationhood. Nehru’s language collapsed the real body into its metaphorical version and turned violence against particular bodies into violence against the nation. Nehru’s concept of the body politic stood against the idea of the nation as a common ethnicity or identity; rather, the body politic invoked a common politics that would unite the colonial world.

Writing in prison at Ahmednagar Fort in 1944, Nehru had been disconnected from the freedom movement for thirty-four months. In 1942, Nehru had reluctantly supported Gandhi’s demands for full independence. The British, anxious to throw all the resources of India into World War II, didn’t move on the demands, instead arresting Gandhi and the Congress Working Committee. While Gandhi was moved to the Aga Khan Palace in Poona—a house arrest to avoid the optics of having imprisoned Gandhi—the working committee was sent to Ahmednagar Fort, a building surrounded by a moat and accessible with a drawbridge.105 This arrest insulated the government, which was preoccupied with war and famine, from the criticisms and resistances of Nehru. The effects of removing the Congress Working Committee from political movements by arresting them had profound consequences

104 Ibid.
for the country: it was arguably one of the causes of the rise of the Muslim League, and, eventually, of partition.\textsuperscript{106} This insulation and isolation from both action and learning—from the struggle and from the library—allowed Nehru to abstract specific bodies suffering starvation into the body of the state. Nehru experienced the force of imperial constraint on his own body, a body literally suffering under colonial rule. This distance allowed him to theorize the famine as an imperial disease—unlike Chittaprosad, who was drawing on the frontlines of starvation and its consequent epidemics.

In \textit{The Discovery of India}, Nehru contemplated the idea of the nation and, in his meandering style, offered many possibilities. The key essay in this regard—“Bharat Mata” (Mother India)—appeared in the third section of his book, “The Quest.” In this essay, Nehru recounts how, on his journeys through India’s villages, he would ask people cheering for victory to mother India what this “India” that they were cheering for was. They would reply with answers such as soil or earth (\textit{dharti}), but Nehru was not satisfied. What earth? He took earth to mean land, but pressed further: was it your land, the land of your village, or the land of all of India? Nehru himself was trying to resolve the problematic formation of a national identity that could unify the political geography of such a diverse country. Eventually, in a pedagogical move, he argued that India was its people—and claimed to watch people’s eyes clear with understanding. Nehru argued for a body politic, made of bodies.\textsuperscript{107}


\textsuperscript{107} Much has been said about Nehru’s body politic and his crafting of a rhetorical language with which to address the body of the imagined-nation-coming-into-being. For example, Ananya Vajpeyi brings up Partha Chatterjee’s claim that Nehru’s language shows him acting like the leader of a nation well before it was possible to have imagined the country as a nation and Nehru’s role in it. Vajpeyi, conversely, argues that Nehru was looking for a language with which to make sense of the imagined-nation-coming-into-being, which it seems he could not grasp as well as Gandhi could. Chatterjee, in contrast, points out that because Nehru was continually elected president of the Indian National Congress, he had a platform from which to imagine the state. Nehru occupied both positions: he managed to occupy this double bind and
Bharat Mata, as a visual concept, had traction as an allegory of nationalism (Figure 1.13). Nehru’s own nationalism could not escape the figuration of Bharat Mata as a Hindu goddess with a lion, inscribed into the outline of the Indian map. Sumathi Ramaswamy has argued that this image making was a way of doing politics—a politics that represented India as a goddess who should be not only revered as powerful, but also defended. The body, in the image, was subordinated to the body politic, to the extent that the former could be sacrificed to the latter. Art production has, in multiple ways, attempted to manage this image. Famous among these attempts is Abanendranath Tagore’s depiction of a woman with features and weapons that did not conform to the stereotype of the goddess, which was far from a

revolutionary reinterpretation of the concept. This management of the image has largely been a failed endeavor, and figurations of Bharat Mata as goddess have persisted (Figure 1.14).

Figure 1.14. Abanindranath Tagore, Bharat Mata, 1905.

Mitter tells the story of how Tagore, when studying oil painting with Charles Palmer, was alarmed when a model hired for figure drawing began to undress. When Palmer gave Tagore “a human skull to draw, he could not bear the object in front of him, imagining being attacked by countless unknown germs and literally falling ill at the very prospect.”

Ironically, Chittaprosad, who confronted naked bodies, skulls, and disease in his documentation of the famine, drew individual human bodies in ways that resisted their appropriation into the body politic of India (Figure 1.15). Atul Dodiya’s image series, *Tearscape* (2001), draws on the Bharat Mata figure, but his “mother” is portrayed as deranged and manic (Figure 1.16). Dodiya’s mother recalls Chittaprosad’s “shriveled up old woman sitting below a dead banyan tree” from *Hungry Bengal*, and thus references the continuing conditions of hunger and the failure of the postcolonial state to make good on its promises to guard against hunger. (Figure 1.17) While Nehru and many others presented allegories of the body politic, Chittaprosad proleptically insisted that it was not the abstract body of the state, but specific people, who were dying.

Figure 1.15. Chittaprosad’s skull drawings from *Hungry Bengal* (Bombay, 1945; reprinted in facsimile by DAG Modern, New Delhi, 2011).

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The Double Interpretation of Famine

The famine was interpreted in two ways: it was seen as a problem of lack or dearth to be solved by biotechnological modernity and, at the same time, as a problem of distribution, of both land and grain, to be solved by politics. This double interpretation of famine—as a problem of production vs. a problem of distribution—undergirded the politics of postcolonial India. Nehru based his food policy on political reform because he understood famine as consequence of a failed politics of distribution rather than as a technical problem of scarcity.
When India transitioned to independence, it faced a significant challenge in its food sector. The country dealt with severe wheat shortages during the first and second five year plans—from causes that ranged from drought to land productivity. Nehru believed that one way to increase agricultural production was to give land to its tillers—that is, to return land to those who labored on it. Nehru posited that if people owned their own land, they would have the incentive to produce more food and that this would increase production. Thus, Nehru pushed for a model of political reform over technocratic change in the agricultural sector. This was a difficult task because Nehru did not have the support he needed from the state and local governments. Throughout the 1950s, food shortages continued, with shortfalls made up for by importing food from other countries, largely the United States.\(^\text{111}\)

The interpretation of famine as a problem of lack to be solved by biotechnological innovation was linked to neo-Malthusian arguments, which were in turn predicated on a balance between people and food. According to these arguments, any imbalance—any excess of people—would lead to a population collapse that would bring people and food back into balance. In as much as this dissertation is about scarcity, it is also about its opposite: on one hand, the desire to produce an abundance of commodities, food, and ideas, and, on the other, the desire to control excesses, whether of population or inefficiencies. This dissertation, built on the foundation of the Bengal Famine as a marker of lack, is interested in investigating the technologies, infrastructures, and aesthetics of the transformation of that lack into a surplus through a developmental model.

Each iteration of these mutating Malthusian metaphors affected development in its own specific ways. For example, if representations of starving bodies figured scarcity, dams were imagined as interventions that would transform scarcity into surplus. In addition, their massive concrete forms materialized the abstract state as infrastructure. In another instance, universities created experts and expertise around the idea of producing surplus food. The upshot of this was that it allowed foreign biotechnological capital to make inroads in the countryside. Thus, Malthusian imaginations of scarcity had a profound impact on the landscape of post independent India.

Given the measures the state took to keep the price of food low, the government was very conscious of a volatile public ready to agitate against food shortages. Yet, while food and food shortages remain one of the more conventional theaters of political representation, architecture occupies a wholly different register. No government won or lost an election because of the design and execution of a city like Chandigarh. So how did symbolic value find expression in the political theatre of food? And how did the state attempt to change that symbolic language, especially in the context of eating, which has its own social and ethical considerations? What symbolic value does the commodity of architecture wield in relation to traditional commodities like food?

The Body as a Material Concern

In the work of Janah and Chittaprosad, the body emerged simultaneously as a material concern and as a political analogy. As a material concern, the body was pointedly a human’s instrument with which to labor. This capacity to labor was doubly robbed from the famine victim: the economic capacity to sell his or her labor in order to buy food, as per Amartya Sen’s analysis, and the physical capacity to perform labor due to the loss of bodily
mass and muscle. In representing the destruction of this material instrument aesthetically and politically, artists from the 1940s forecast the material concerns of the developmental state: rural labor, industrial labor, and the concrete, brick, and steel which would make the imagined nation into material fact.

Developmental economics’ double interpretation of famine had lasting consequences. Out of the first interpretation rose neo-Malthusian economics, and out of the second came the Nehruvian model of political reform: protect the farmer. In what follows, I address the ways in which developmental economics approached the material concerns of nation building and the laboring body with an understanding of food as simultaneously a political problem and a technocratic one.

At the heart of developmental economics is this problem: how do you create surplus without capital? Put another way, how do you create an excess from conditions of scarcity? At first glance it may seem that scarcity and excess are the opposite of each other, and in some ways they are: the scarcity of some resource or commodity is defined by an excess of demand for that same thing. Yet, in terms of ideological political economies, scarcity and excess are separate categories of analysis. Consider the opposition between scarcity and excess in this assertion: food is scarce because population growth is excessive. This fundamental tenet of neo-Malthusian bio-economics seems to set up an opposition between scarcity and excess. But while scarcity is imagined as a commodity such as food that can be controlled and distributed, population is imagined as an uncontrollable growth. Therefore, the opposite of scarcity is not excess, rather, it is surplus. The difference between surplus and excess is in the nature of control: an excess of population is one that is not amenable to the
rules of open market demand and supply. Rather, excess invokes uncontrollable growth, difficult to check without resorting to authoritarian diktat.

Ideas of plenty, excess, abundance, and surplus are, like scarcity, historical and ideological fantasies. “Abundance” functions outside of quantitative terms and instead it stands in for unquantifiable bounty—an incalculable excess which can only be conceptualized by figures of god and nature. “Plenty” captures the boundless sky and the mighty Himalayas; it operates as a utopian non-place where technology and nature interact in symbiotic precision, the former extracting from the latter its latent potentialities. In the wake of the famine, Punjab was linked to Bengal as its inverse, so that the dearth of one people was balanced by the excess of another. In connecting Punjab with Bengal, the nation state presented and proclaimed its political geography: the collapse of internal divisions to the benefit of a mathematical equilibrium.

An early iteration of this political suture is evident in the September 24, 1944, issue of the People’s War (Figure 1.18). Its front page celebrates the festival of Dussehra, and in that same celebratory tone presents the photo essay that occupies the right vertical side of the page. This essay, “Our Great People,” consists of three photos, all by Sunil Janah, celebrating the figure of the peasant across the nation. “A peasant beauty from Malabar” occupies the first frame. The second contains the faces of two children and is captioned, “Bengali children smiled thus before the famine.” The last image, of a row of turbaned men whose head-gear makes a diagonal across the image, is captioned, “grand Sikh kisans [farmers]—they make Punjab, India’s granary.” The photo essay ties together Punjab and Bengal by suggesting that the hungry children of famine are waiting for sustenance from the labor of the Punjab’s kisans.
On one hand, the three images serve to display the nationalist rhetoric of “unity in diversity”—the coming together of diverse people to form the body politic of the nation state. On the other hand, diversity was a question not simply of identity but also of economics: the nation could be a site for exchange, a political antidote to the inequities of geography. The famine remained a problem of distribution, and the independent nation state promised systemic economic and logistical remedies.112

Punjab as the plentiful granary of the country remained a critical mythology of industrial modernity and a potent piece of ideology; later this status of supplying India with grain meant that it too would be roiled by politics and Punjab had its own secession movement. At the heart of the disput was the question: to whom does the produce belong? The farmers or the nation? Who decides where surplus (excess) should accrue? Although it is difficult to pinpoint the precise moment when Punjab acquired the title of nation’s granary, it likely secured the name as a consequence of Burma’s declining exports to India. The dubious honorific of one place being the granary of another was common within the British Empire, and references to Punjab’s status emerged as early as 1923. By 1947, the phrase was solidified. After the Green Revolution, “bread basket” replaced “granary,”—that is, the processed commodity of bread replaced the raw agricultural commodity of grain. Technocrats insisted that Punjab’s status was a result of the biotechnological, and not the ideological, encounter.113

112 This front page is reproduced in Rahman’s book on Sunil Janah, where he argues that the composition of images was used to visually demonstrate the slogan of unity in diversity. The page is signed by Chittaprosad. Ram Rahman, Sunil Janah: Photographs 1940-1960 : Vintage Prints from the Swaraj Art Archive (Vijay Kumar Agarwal, 2014).
113 The phrase “granary of India was used about several regions in the 19th and early 20th centuries. Edmund Burke used it for the Carnatic region in the context of a famine, where he commented that people died in what was the Granary of India. While used about Burma in the late 19th Century, the phrase came to be
In the following chapter, I ask what it means to be an antidote to famine and to become the granary of a nation—especially given that “granary” is a metaphor drawn from ancient urban taxation and the nation is a modern political concept. Punjab instantiated the powerful myth of plenty within a surrounding scarcity; this ideological construction of abundance determined concrete consequences in that state after independence. What institutional and infrastructural demands did this ideological construction make on Punjab? What were the material consequences of being conceived of as a site of abundance? How did this idea of Punjab as agriculturally prolific play a role in the philosophy of scarcity that animated projects in other parts of the country? What sort of mythology is necessary to imagine a land of plenty? And what happens to the visual language of excess in the context of a surrounding scarcity? In other words, what does it mean to see the dam as metaphor of abundance, and does the materiality of the dam either corroborate its metaphorical nature, or contradict and push back against it?

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associated with the Punjab as Burma’s exports to India declined during world war 2. The word bread basket is not used regarding Punjab until after the Green Revolution. It is usually used such: the green revolution made Punjab the bread basket of India. Burke, Peter. *The Public and Domestic Life of the Right Hon. Edmund Burke*. (N. Cooke, 1854), 178.
Chapter Two

Concrete

In 1948, in a speech given to the engineers at the Central Board of Irrigation and Power (CBIP), Jawaharlal Nehru, longtime leader of the Congress party and India’s first Prime Minister, made a comparison between temples and public works that he would spend the next decade building upon.¹ In his speech, Nehru implied that a state suffering scarcity could not rely on monumental architectural expression to provide its national symbols. Instead, public works were made into icons of the new nation state’s ambitions to be self-reliant and socially equitable.²

Perhaps the onus that Nehru put on public works in a country undertaking a landmark experiment in democracy, decolonization, and the making of the Third World

¹ Now we live in a different age. We do not spend much time and energies so much on mosques, cathedrals and temples, but on other types of public works. But those public works should also be fine and beautiful because there is faith. Jawaharlal Nehru, “Nineteenth Annual Meeting of CBIP, December 5, 1948,” in Modern Temples of India, 2(d).
² It is of note that the post-independence idea of self-reliance did not match with Gandhi’s concept of “swadeshi.”
should be understood as a charge to architectural historians as well: when studying the 1950s and 60s, it is not cathedrals but public works that underpin the aesthetics of development. This aesthetic of scarcity opens the door for architectural historians to turn their attention towards public works not only because these works were a political technology with which bodies and commodities were governed and made, but also because public works had the capacity to be “fine and beautiful.”

This chapter makes three arguments. First, I show that the Bhakra Dam was important to Nehru because the iconic structure embodied the unity of a laboring nation, a competent state, and technological prowess. While the starving body represents colonialism, the laboring body stands for social democracy. Second, I argue that, in making the dam, the state made itself: India established a technocratic elite and created the conditions to deploy infrastructure across its political geography. Concrete itself played an important part in this state-making function by retooling certain social problems as scientific categories. Finally, I contend that the dam embodied the technomodern aesthetic of India’s political economy: technology, the economy, and the nation became transposable. This aesthetic was crafted through various representations of the dam in stamps, films, journals, pamphlets, and models. The image of the dam traveled and circulated significantly further than did the power, water, and industry actually produced by the project.

The Bhakra Nangal Multipurpose River Management System consists of a series of infrastructural interventions made in the upper segment of the Sutlej River on the western side of the region of Punjab in India in the 1950s and 1960s (Figure 2.1). The largest piece of this

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network of water infrastructure was the Bhakra Dam and power plant. Downstream from Bhakra was the Nangal Dam, which diverted water into the two Nangal hydel channels. These channels flowed into the Ganguwal and Kotla Power Houses before becoming the Bhakra Main Line Canal, which irrigates agricultural land in Rajasthan. Further down the Sutlej River is the nineteenth-century Ropar Headworks, a structure that diverts water into the Bist Doab Canal and the Sirhind Canal. Together these comprise one piece of an extensive hydraulic system, decades in the making, that manages water for irrigation and hydroelectric power in the Indus basin.

“Bhakra” tends to act as shorthand for all the post-independence interventions in the Sutlej River. The dam itself is a straight gravity concrete structure, built in a gorge that was once called “a site made by God for storage.” The Sutlej River flows through the last of the Himalayan ranges in the Indo-Gangetic plain, cutting through mountains whose geology consists of faults and traverse gorges. Construction in this topography involved the difficult act of continuously pouring extensive amounts of concrete in steep mountainsides, which required access to expertise and technology at an unprecedented scale.

Embedded in this coagulated and massive object are multiple histories: the series of decisions through which the project developed, canal building in the Indus basin, the partition of land and water between India and Pakistan, and the history of the freedom struggle and decolonization. Accordingly, the story is complicated by the metaphorical and symbolic weight of the dam, national versus local interests as they played out in the construction process, a history of technocracy and its improvement of nature, and the history of the cement and concrete industry as they responded to this changing landscape. The history of modernism and design is tangled up with that of public works and infrastructure. This chapter shows how the state produced itself as it produced its infrastructure, how technocracy and nationalism fed each other through this co-production, and how infrastructural decisions affected India.

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4 The story goes that Sir Louis Dane, having visited the Maharaja of Bilaspur, was sailing down the Sutlej, and when going through this gorge, remarked that the site was made by God for storage. Thus began the Bhakra Nangal project. The story is apocryphal not in the sense that it isn’t true, but rather because, as legend, it occupies the point of an origin, offering all histories of the Bhakra a sentence with which to begin. Sain, Kanwar. Reminiscences of an Engineer. (Young Asia Publications, 1978), 58.

5 “Concrete Manufacture, Handling and Control at Bhakra Dam,” Indian Concrete Journal 31, no. 8 (August 15, 1957): 241–49.
As the single largest investment in the first five year plan, the Bhakra carried symbolic weight. Most closely associated with the phrase “temples of modern India”—a mutated version of Nehru’s analogy discussed at the opening of this chapter—the dam remained one of the Prime Minister’s favorite retreats from the politics of Delhi. He sent visiting Third World dignitaries to the construction site to display this symbol of India’s capacity for development; the dam reinforced a pact among Third World nations to create self-sufficiency and cooperation as a means of decolonization. Although the project was redesigned towards power production, its genealogy is embedded in a colonial public works and irrigation effort. The dam thus symbolizes decolonization through technomodernity.

A Genealogy of Colonial Public Works in Punjab

The Punjab and the Sind, the westernmost regions of the Indo-Gangetic plain (Figure 2.2), came under the jurisdiction of the colonial administration in 1849. Annexed by Lord Dalhousie, then Governor General, these were the last territories to be acquired by the East India Company before the crown took over India in 1858. In 1855, Dalhousie had instituted a central Public Works Department alongside its local corollaries—an event that signaled a shift in the nature of public works in India. Punjab and Sind, only newly acquired, presented a geography amenable to this new kind of public work. Canal building, which transformed the basin over the next hundred or so years, can be divided into three phases. The first phase took place in the years before and after the Canal Act of 1873, which allowed for

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7 Mridula Mukherjee has vehemently argued the opposite, that the post-independence remaking of Punjab’s agricultural social relations radically broke from its colonial productive capacity. She argues that colonial Punjab, contrary to the official narrative, encompassed large swathes of underdevelopment and commercialization and lacked capital investment. This is to say that the claim that Punjab’s hydrological history is embedded in colonial environment-making is not without opposition. Mridula Mukherjee, *Colonializing Agriculture: The Myth of Punjab Exceptionalism* (SAGE Publications [u.a.], 2005), http://elearning.unifr.ch/bibup/uploads/14616978070748/14616978070748extrait.jpg.
the building of canals as a means of gaining territorial and environmental control. The second phase occurred around 1906 and was defined by the Triple Canal Project, in which perennial canal water supply through integrated projects consisting of multiple works became the norm.

The third phase, around 1919, was defined by the Sutlej Valley Project, which built an integrated canal system in the basin and in the process developed a bureaucracy around water that carried over into the post-independence state.

Figure 2.2. Map of British India, 1877, the Indo-Gangetic Plain in the north of the sub-continent, south of the Himalayan range, with the Gangetic rivers flowing east into the Bay of Bengal, and the Indus rivers flowing west into the Arabian Sea. Map from the Harvard Map Library Collection
The geography of the Punjab and Sind is the geography of the Indus river basin. It comprises the fertile yet arid tracts where the Indus flows down from the Himalayas into the Arabian Sea. These plains, north of the tropics, suffer extremely hot summers. Coming up the Arabian Sea, the monsoon winds pass over the Sind, leaving them a desert, while raining down in Punjab where they hit the wall of the Himalayas. Even with the river, people depended largely on the rain for both pastoralism and agriculture.\(^8\) Furthermore, the region relied on the annual flooding and silting of the rivers. Modern agriculture was designed around structures that trapped water and silt in basins with small embankments in the summer months when it flooded, in order to achieve both a *kharif* (summer) and a *rabi* (winter) crop.\(^9\)

In these conditions of arid fertility, the British launched their argument for canal works. As Strachey recounted in 1903:

The canals of Northern India give to the State a good direct return on the cost of their construction, but the direct receipts are no index whatever to the benefits which are conferred by them upon the country. They give to great tracts complete protection against scarcity and famine, the wealth of the people is immensely increased, and it not seldom happens that the whole first cost of the works, although this is measured in many millions, is less than the value of the crops saved to the people in a single season.\(^10\)

Strachey argued for canals as protection from famine and scarcity and as an investment that would produce returns. Strachey’s easy imagination of the canal as a techno-hydraulic utopian insertion masked the co-production of legal history, innovative engineering, and political conflict that assembled itself around the as-yet uncommodified resource of water. For instance, the first major canal project, the Bari Doab Canal, was undertaken in 1849 as a reconstruction of Shah Jahan’s seventeenth-century Hasli canal, which took water from the

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\(^10\) Strachey, *India*, 220.
Ravi River to the city of Lahore. But the Bari Doab Canal was expanded and pushed forward by the British for largely political ends: in the wake of the annexation battles, the canal was intended to employ disband Sikh soldiers, who were unlikely to take up agriculture in tracts of land with no water supply. This project was followed by the Sirhind Canal. These irrigation projects were used to “settle” populations at the frontier; the British turned to a combination of property law and public works to establish control of the environment and territorial legibility.

In 1867, India appointed its first Inspector General of Irrigation. The Canal Act of 1873 laid the foundation for a state-led irrigation development model. Its preamble reads, “Throughout the territories to which this Act extends, the Provincial Government is entitled to use and control for public purposes the water of all rivers and streams flowing in natural channels, and of all lakes, sub-soil water and other natural collections of still water.” The act put the control of water at the center of the claim to territory, remaking the government’s “public” role in managing water that had been subject to private uses and works. As water came under public jurisdiction, irrigation works became central to the territorial-environmental project. Over the next century and a half, the Punjab would go from a fertile

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11 In 1633, Shah Jahan’s engineer, Ali Mardan Khan, constructed the Hasli canal from the Madhopur Barrage on the Ravi River, primarily to move water down to the city of Lahore, across the Bari Doab, for the Shalimar gardens. This canal may have also contributed to irrigation around that time. Mughal canal and water works had urban and imperial biases, and were not particularly directed towards farmland irrigation. Many of these canals used already extant dry river beds to transport water to trapping areas. The Hasli canal was discovered and mapped in 1847 by Punjab’s first Chief Irrigation Engineer, Lord Napier. He imagined that the Ravi had enough of a water supply to extend the canal all the way down to the lower plains of the Bari Doab (Sultan), but there was not enough water in the Ravi to do that. A canal for the lower plains was only constructed in the Triple Canal Project. See Public Works Department Punjab, *Completion Report and Schedules, Triple Canal Project, 1917*, vol. 1 (Lahore, Punjab: Superintendent Government Printing, 1919), 1, http://hdl.handle.net/2027/uc1.$c213641.


14 For a longer discussion of the transformation of water into a public commodity through the Canal Act of 1873 see Gilmartin, *Blood and Water*, 106.
agricultural region dependent on rain for early crop, to one of the most irrigated and productive regions of the world.

A number of canals were built by the Irrigation Department under the aegis of the Public Works department. Gilmartin shows how the Punjab administration depended on tracts of land called “wastelands,” or sometimes “crown wastelands”—that is, unclaimed territory, outside the boundaries of villages, that could be incorporated into the “public” fold. Canals became tools to irrigate these wastelands, on one hand, and to manage and contain villages, on the other. In the process, the pastoral communities were settled and encapsulated “within a vast structure of canal works physically ‘commanding’ the Indus basin’s ‘wastelands’ on a previously inconceivable scale—and defining them as subject to a larger environmental ‘system.’”15

From the 1890s onwards, the nature of irrigation works shifted again, this time from seasonal canals to perennial ones. The Triple Canal Project, constructed between 1905 and 1907, consisted of three major canals and their headworks that linked three of the five Indus tributaries. The first, the Upper Jhelum Canal, diverted surplus winter water from the Jhelum River, carried it across the Jech Doab, and deposited it into the Chenab River. The surplus water in the Chenab River now supplied the Lower Chenab Canal, so that a different, upriver canal, the Upper Chenab Canal, could divert water across the Rechna Doab and into the Ravi River. This surplus water flowed into the third and final canal, the Lower Bari Doab Canal, which irrigated the lower tracts of the Bari Doab. As this description highlights, an important aspect of this project involved the linking of rivers to each other, which hadn’t been previously done. The headworks constructed were also some of the largest built up to that

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15 Ibid., 145.
time; as a result, the system could move enough water to both irrigate land along the way and feed water into the next river. The project affected three more existing lower plain canals, bringing a total of six canals into its jurisdiction.\textsuperscript{16}

The Triple Canal Project exemplifies the role of politics, law, and expertise in co-producing integrated water systems of the Indus basin. The aim of the project was to bring water to the lower Bari Doab, but proposals to divert it from the nearer Sutlej River met with much opposition, particularly from the districts of Bahawalpur and Bikaner on the lower plains of the Jhelum.\textsuperscript{17} These districts were not part of British territory, and the residents worried that these outflows would decrease their access to water. The Bahawalpur State objected to the diversion of water from its only source.\textsuperscript{18} Thus the lower Bari Doab was irrigated with water from the Jhelum-Chenab-Ravi link, rather than from the Sutlej, which was significantly closer to it. Furthermore, after linking these rivers together, the government had to develop a system of shares to distribute the water. Older canals tied into the linked system could not be part of this allocation, as water law demanded that earlier canals had prior rights to the waters from which they drew.\textsuperscript{19}

Simultaneously, new irrigation-related boards were created at the all-India level, as advisory boards to the provincial governments. In 1906, the post of Inspector General of Irrigation was created, along with a Public Works Secretariat headed by an engineer. This post was subject to title changes that culminated with the creation of the Central Board of Irrigation in 1927. The board was supposed to examine reports on irrigation, hydel, and river

\textsuperscript{17} A \textit{Doab} is the tract of land between two rivers.
\textsuperscript{19} Aloys, \textit{The Indus Rivers; a Study of the Effects of Partition.}, 92, footnote 63.
control problems and advise provincial governments.\textsuperscript{20} However, a body such as this at the central level was soon called on to resolve disputes about the shares of water available to districts along the river, especially since the districts were growing and becoming more contentious. The Central Board of Irrigation laid the foundation for post-independence central bodies of experts that would later adjudicate inter-state disputes resulting from dam building.

In 1919, the Punjab government initiated the Sutlej Valley Project. First proposed in 1894 and stalled because funds and manpower were needed for World War I, this project was many years in the making. It encompassed four major new weirs, all in the Sutlej valley, to divert water into eleven new canals, around half of which were perennial.\textsuperscript{21} Although the project was imagined to be, engineering-wise, a continuation of the Triple Canal Project, things did not go as planned. Three barrages were constructed by 1927, and, in 1929, one of them, called the Islam Weir, failed in a heavy monsoon. The failure led the engineers to reconstruct conservatively, doubling the number of bays and redesigning the remaining weir, the Panjnad Weir.\textsuperscript{22} The project was significantly more expensive when finished, and the water supply from the Beas-Sutlej rivers was not sufficient to meet requirements.

The major sticking point in the ongoing dispute between the Sind State, the Bahawalpur State and the Punjab government was the creation of the Bhakra Dam for storage in the upper plains of the Sutlej. This dam project was the first of its kind in the basin, and it was unclear how it would affect seasonal water supplies downstream, which was a matter of concern to district governments. While at one time the project was sanctioned as an irrigation


\textsuperscript{22} The buttresses on the Islam Weir were increased from 6 to 11, and the load distribution on the Panjnad Weir was restructured. Aloys, \textit{The Indus Rivers; a Study of the Effects of Partition}, 97.
storage reservoir, it was not initiated, and later, changing conditions saw the district of Sind oppose the project again. The debate on this project became contentious enough that, in 1935, the Central Irrigation Board appointed the Anderson Committee to review the works, and Sind accepted a 500-foot dam at Bhakra. Yet, in 1939, when designs changed again, Sind withdrew its acquiescence, and the government was forced to appoint a quasi-judicial committee headed by Justice Rau. Gilmartin, who has written extensively on the ways in which the committees assessed the distribution of water between Sind and Punjab, shows how legal, cultural, and political language slid into the technical assessment of the works—for instance, the wastefulness of certain irrigators was mentioned.23

These negotiations over the Sutlej waters set the stage, and even set precedents, for the Indus Water Treaty, which governs the sharing of water between India and Pakistan. The treaty, which was brokered by the World Bank and signed in 1960, allocated the waters of the Jhelum and Chenab to Pakistan, and those of the Sutlej and Ravi to India (see Diagram 2.1). Nehru ensured that the Bhakra Dam stayed out of treaty negotiations; work on the project began in the early 1950s.

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23 For a sustained and detailed reading of the water dispute see Gilmartin, Chapter 6, “The River Basin and Partition,” in *Blood and Water*. 
Diagram 2.1. Schematic diagram of the Indus infrastructure system. The dotted line marks the border between India and Pakistan, showing the division of infrastructure on either side.

The legacy of these disputes brought a legal, technical, and cultural language into the history of water management, setting the stage for a partition adjudication over the river. It also saw the development of a number of institutions at the central level consisting of Indian engineers like A.N. Khosla, who would play key roles in the technocratic dam-building drive of the post-independence state.

Politics and Planning: Nehru's difficulty in managing politics

In 1947, at independence, the government of India was synonymous with the Congress party, which held power at both the central and the state levels. However, the
Congress party was an umbrella party, to which people with ideologies ranging from left to right belonged.\textsuperscript{24} Given this ideological range, Congress party members from the center-right saw Nehru’s planning commission as a step towards communism. Thus the right-leaning side of the Congress party became set against land reform policies. Entrenched in the party’s organization, these members consolidated strong electoral bases at the state and local levels.\textsuperscript{25}

Nehru, as Prime Minister, was the head of the planning commission and structured the body to have a privileged position in economic decision making. Partha Chatterjee, in his seminal work \textit{The Nation and its Fragments} (1993), describes the planning commission as a body designed to determine state policy. As ideas of the nation state began to coalesce in the late 1930s, nationalists debated a coordinated and consistent set of policies in anticipation of a country that would be run by a Congress government with consolidated power.\textsuperscript{26} The appeal of this planning body was that it consisted of a committee of experts who would base their decisions on scientific grounds. Nehru held that this process of rational decision making was distinct from—and even the opposite of—the petty squabbles of politics.

Chatterjee argues that the planning commission had two purposes: the first was to make decisions about development, which he argues, functioned as a form of primitive accumulation, transferring wealth and power into the construction industry, and the second was legitimation of the state through equal rights over private property and commodities.

\textsuperscript{25} This opposition between the center’s control of economic decision making and the state’s electoral control put the two in contest with each other such that any agricultural policy needed to appeal to both sides of the Congress party. Varshney, \textit{Democracy, Development, and the Countryside}, 30.
\textsuperscript{26} According to Chatterjee, the nation state is only one iteration of many ideas of the nation that were in circulation in intellectual and political debates. Partha Chatterjee, \textit{The Nation and Its Fragments: Colonial and Postcolonial Histories} (Princeton University Press, 1993), 201.
Planning was a site where accumulation and legitimation could take place without the social conflict that usually accompanies them.  

Technocracy, Engineers, Architects, and Concrete

Ajudhya Nath Khosla’s career maps onto the development of water bureaucracy in India. Born in 1892, Khosla trained in civil engineering at Rourkee University in the United Provinces before joining the Punjab government’s civil engineering service. Khosla, who was posted in Mesopotamia with the army core of engineers during World War I, was a gifted engineer and rose quickly through the ranks of the institution. In 1934, he published an edited volume, featuring his own research, on the engineering of weirs on permeable foundations. His work suggested design solution for weirs in the upper plains of rivers, where soil conditions were permeable and therefore quite wet and it was unclear how water movement in the subsoil would affect the structure’s performance and design. Relatively little was known about engineering in these conditions.

The 1935 Government of India Act, which set out to separate central versus provincial matters, gave provincial governments autonomy in matters of irrigation, which allowed them to make all decisions regarding canal-building in their territories. Yet, because unilateral action upstream could have adverse effects downstream, interprovincial rivers and disputes about them continued to be under the control of the Governor General. However, the

27 Ibid., 213.
technical authority at the center consisted of engineers from the public works departments of provinces, and so the center created a post for a consulting engineer for irrigation, waterways, and navigation.

Irrigation development fell under the Ministry of Labour, which, in 1943, was headed by Dr. B.R. Ambedkar, who saw the need for a technical, engineering authority that would collect and collate data to advise the government on decision making. In 1944, Khosla drafted a proposal to set up the technical body to manage these concerns, which, in 1945, was set up under the Labour Department. Ambedkar requested that Khosla himself head the new commission, arguing that it would be best if this position were given to an Indian engineer. Khosla left his position as civil engineer to the Punjab government and joined the central government’s bureaucracy.\textsuperscript{30}

Simultaneously, developments on the electricity front were led by the Central Electricity Commission under the Ministry of Works, Mines, and Power. To develop schemes for hydroelectric power, the commission worked closely with the Central Waterways, Irrigation, and Navigation Commission (CWINC). In 1950, the Ministry of Works, Mines, and Power passed a resolution to create two new bodies: the Bhakra Control Board and the Bhakra Advisory Board. These bodies acted as final authorities on smaller works undertaken by local public works departments. At the table were the states affected by the project: Punjab, PEPSU, Rajasthan, and Bilaspur.\textsuperscript{31} While the Bhakra Control Board adjudicated on tenders, proposals, costs, schedules, and specifications, the Bhakra Advisory Board mediated

\textsuperscript{31} PEPSU stands for Patiala and East Punjab States Union, a group of disconnected territories that were organized together administratively between 1948 and 1956. The eponymous capital city of the state of Bilaspur was submerged in Bhakra reservoir. Sind and Bahawalpur, previously the largest objectors to the project, were now in Pakistan.
among disputing parties and examined progress. The Advisory Board’s purpose—to “resolve differences arising on a technical level”—acknowledged the cross between the technological and the political in public works: they were fundamentally inseparable as categories.

As head of the CWINC, Khosla was vice chairman of the Bhakra Control Board and all other multipurpose project boards. In this role, he undertook surveys and investigations on damming all major rivers in the country. Images of him, outfitted like an explorer, traveling down rivers and picnicking in virgin landscapes are complicated signifiers of his techno-imperial project-building drive (see Figures 2.3 and 2.4). Klingensmith quotes Khosla’s contemporary, Meghnad Saha—himself an advocate of big dams and crucial in creating the Damodar Valley Corporation—who critiques Khosla’s method: “the chairman of the CWINC was combining in himself the functions of Brahma Vishnu and Maheshwar. He drew up designs, he executed the schemes himself, and as Secretary he passed the whole thing himself.”

I would add that Khosla was not only pretending to Hindu cosmological powers, but also fashioning himself in the mold of a Christian-colonial explorer, traveling up a river to find its source. Except he travelled to find another kind of origin: a point in the mountain at which to create a new kind of beginning for the river and the country.

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33 The narrative of the traveler and the travelogue is something that Mary Louise Pratt attests to in *Imperial Eyes*, especially in her reading of Richard Burton’s *Lake Regions of Central Africa*, which showed how the Victorian explorer “won” geographic discoveries in Africa for England. Pratt argues that maps and surveys were visual tools of conquest; that is, that surveying and describing land from a vantage point constituted acts of discovery and control. Picturesque image making then translated what was often a brutal expedition into a managed image of conquest, which she calls the “monarch-of-all-I-Survey” gaze. In this context, Pratt introduces the “oedipal” dispute between Speke and his mentor, Burton, over the source of the river. Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation*, 2nd ed. (Routledge, 2007), 201–206. The Nile held particular importance in the history of Christianity, which did not translate to the Sutlej; however, the search for the source of the Sutlej and the Indus had their own complications. The source of the Sutlej still remained unknown in the early years of the nineteenth century, while that of the Ganga had been located. In part, the fascination with the sources of the Ganga were tied into a desire to
In 1951, the CWINC absorbed its electrical counterpart, the Central Electricity Commission, to form the Central Water and Power Commission (CWPC), an apex technical body that continued to serve under the Department of Works, Mines, and Power. In 1952, as the relationship between hydel and irrigation became more robust, the body came under the aegis of the Ministry of Irrigation and Power. The CWPC, with Khosla at its head, embodied the developmental model in first and second decades of independence. The gifted engineer overlay a geographical reality onto a mythological narrative of the river descending from heaven itself. This source, the Gangotri, was discovered alongside a temple, underscoring the desire to subject this fluvial origin to a British gaze. Stories of two massive lakes, the Mansarover, which was already mapped and the yet-unmapped Rown Rudh, were in circulation, and these became the next expeditionary prize. Hyder Jung Hearsey, a jagir owner bordering Nepal, teamed up with William Moorcraft to locate this lake and the source of the river. The geographical expeditions in search of these origins paralleled British imperial desires for Tibet, and these sources no longer held similar weight after twentieth-century borders separated them from the states that they served. Charles Allen, *A Mountain in Tibet: The Search for Mount Kailas and the Sources of the Great Rivers of India* (London: Deutsch, 1982), 80–99.
had direct access to the prime minister and imagined that India’s dam building would even surpass Soviet infrastructural projects. With the rise of the CWPC, an extra-democratic bureaucracy developed around hydraulics. The multipurpose dam, given the difficulty in producing an object of its scale, structural complexity, and expense, is necessarily an overdetermined work. The dam’s imagined outputs were multiple and extensive, even when its aims were fundamentally contradictory. Take, for example, the function of producing power, the function of irrigating land, and that of managing water for flood control: to produce power, reservoir levels needed to be kept high so potential energy would be available, but, for irrigation, water needs to be released at crucial weather related intervals. Finally, for flood control, reservoir levels needed to be kept low so they would have the capacity to absorb rain.  

Figure 2.5. Stamp commemorating 25 years of the Bhakra Dam, released 15th December 1988, of denomination 60 naye paise (60/110th, in the new decimalized form of the rupee). Department of Post, Ministry of Communication and IT, GOI.

As these institutions evolved to participate in the developmental project, so too did the storage aims of the Bhakra site. No longer intended only to irrigate the Sutlej plains, the Bhakra Dam became an effort of national importance that would supply water and power to the tristate area of Punjab, Rajasthan, and PEPSU and thus contribute to the developmental project.

What changed in the design of the dam to make it “national”? In 1943, J. L. Savage, designer of the Hoover Dam, visited India and discussed designs for the plan; in 1945, after various negotiations and reconsiderations, the consulting engineers settled on a 395-foot dam. Yet, in the 1946 proposal, specifications for the project remained similar to those in previous proposals largely because of the uncertainty about independence and partition. In 1948, engineers decided to increase the height of the dam to 680 feet because partition entailed the loss of agricultural land and four-fifths of the canal system of the Indus basin to Pakistan (see Diagram 1). Partition, compounded by five million refugees from across the border and the dismal rate of foodgrain production, all came together to support the narrative of the big dam as a solution to the compound scarcities staring down the independent state.

The largest shift in design, by far, was the addition of extensive power production capacity. To produce hydroelectric power, dams need to hold a large quantity of “dead storage,” or stored water that cannot be released for irrigation. As a result, the irrigation function was layered on top of the power function, so the height of the dam was increased to accommodate the perennial water supplies for the canals on top of the dead storage. This new reservoir was so large that the Sutlej did not have enough water to supply it for both
functions.\textsuperscript{35} A feeder canal was introduced downstream, taking off from the Harike barrage where the Sutlej met the Beas, to feed Beas water into the 1866 Sirhind Canal.\textsuperscript{36}

While this solved the canal’s water deficit, the reservoir was still too large for the river. As a result, a connection via two tunnels and a channel was made upstream of the dam, to draw water from the Beas to the Sutlej, with a power plant along the way where the water fell down a thousand feet. A consequence of the dam’s new height was the sinking of Bilaspur. Its reservoir, now called Gobind Sagar Lake, covers an area of one hundred square miles entirely within the princely state of Bilaspur, submerging a fifth of it and displacing fourteen thousand people—some of whom were yet to be resettled as of 2014.\textsuperscript{37}

The Bhakra Nangal Multipurpose River Management Project was contracted, built, and funded as many small pieces, each tendered individually, some to private contractors and others to the Public Works Department. The central government granted loans per quarter to the Punjab and Rajasthan governments, which in turn disbursed these sums to their public works departments. In 1950, irrigable land in Bhakra-Nangal was estimated to have one of the lowest costs per acre—95.7 rupees—of all river valley projects.\textsuperscript{38} The schemes’ costs were charged to the irrigation branch and the electricity branch. By building infrastructure projects,

\textsuperscript{35}Raj, \textit{Some Economic Aspects of the Bhakra Nangal Project: a Preliminary Analysis in Terms of Selected Investment Criteria.}, 58.

\textsuperscript{36}The Sirhind Canal was the second major project undertaken by the colonial government after the Upper Bari Doab Canal, during the first phase of canal building in Punjab. The proposal was brought forth by the Maharaja of Patiala, construction started in 1866, and irrigation commenced in 1882. However, the canal silted up almost immediately, reducing the water supply to a fraction of the designed load. The silting problem was solved with still ponds, which have become standard in this method of construction.


\textsuperscript{38}“Highest Priority for Irrigation Schemes: Plea at Central Board Meeting,” \textit{The Times of India (1861-Current)}, June 20, 1950.
the state produced its own institutions that came to map out the intricate centralized bureaucracy around the construction of dams.

The Aesthetic Ideologies of Cement-Concrete

On the 15th of August 1954—in commemoration of the anniversary of independence—the Indian Concrete Journal published an editorial about the use of concrete for multipurpose projects. The editorial focused on the Bhakra Nangal project, ostensibly because its canals had only recently been inaugurated by the Prime Minister and the project was in the public consciousness. But there was a subtext: firstly, the essay was one of a number of pieces showcasing the Bhakra-Nangal project published on independence day. Secondly, the multipurpose project in Punjab was a huge sink on the strained concrete resources of the country, and the editor of this journal sought to justify the outlay.

The central argument the editor made was that given the structural complexity of the projects being undertaken, traditional materials like lime surkhi were not capable of handling the multiple different needs in play. After all, a multipurpose project needed a multipurpose material. Concrete, he argued, was flexible, waterproof, and, crucially, it could handle abnormal stresses in varying conditions of heat and cold. As a result, concrete was necessary for any project that attempted to contribute to development writ large. For piecemeal small works, a lime surkhi mortar would suffice.

How did reinforced-cement-concrete come to be a key material of “nation building?” As Adrian Forty has argued, concrete is almost without a formal identity because of its flexibility—a property that allows concrete to seem as if it has no ideology, as if it’s
pure material. However, utility itself constituted an aesthetic ideology, one that needed crafting (see Figure 2.6). In publishing essays extolling the values of concrete, technocrats did the work of crafting a narrative of utility and strength for concrete, tying its fate to modernity. By publishing these essays on independence day, they yoked together the nation state and modernity.

Figure 2.6. An image that appeared in a news article, “Great Landmark in Punjab’s History; Building the Nangal Dam” describing “Centre of a new township, the dam is artistic as it is eminently utilitarian.” July 8, 1954, *Times of India*.

**The Associated Cement Companies and the Making of Cement Monopolies**

The *Indian Concrete Journal*, publisher of multiple independence day puff-pieces about the Bhakra Nangal dam, was owned and run by the Associated Cement Corporation, India’s largest cement company at the time of independence and one of the largest companies in India full stop. In 1904, around the time the first integrated canal projects were being launched in Punjab, cement consumption in India was quickly rising. Yet, given the difficulty of producing the material, the only factory that had been set up quickly folded. Even in 1914, the cement output for the entire subcontinent was only one thousand tons, while consumption

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39 Adrian Forty argues that concrete was seen as utilitarian, as opposed to stone or steel which demanded certain formal ends. Concrete, conversely, took whatever plastic form the designer wanted, rendering it a material that had no ascribable principle. Adrian Forty, *Concrete and Culture: A Material History* (London: Reaktion, 2012), 14.
was somewhere around 166,000 tons. The three manufacturing plants present in India at the
time tried to expand their existing capacities to one hundred thousand tons, and yet Indian
cement could not compete on price, delivery, or quality with foreign cements. During World
War I, as foreign cements became inaccessible, Indian capacities began to be utilized, but
these resources were commandeered by the Munitions Board and all capacity was contracted
for the government.40

After the war ended, the government continued to be the largest consumer of the
commodity, and the Indian industry found itself in competition with foreign cement, which
was cheaper and accessible at ports and in urban areas with great ease. Because cement
factories needed to be located around limestone deposits, Indian factories found themselves
far from their consumers, without well-connected freight networks or high productive
capacities. Industrialists demanded tariff protection, but still faced significant hurdles from
internal competition. By 1924, the companies found themselves in an escalating rate-war with
each other. In 1925, they came together to form the Indian Cement Manufacturers Association
(ICMA); the ICMA functioned as a price-fixing organization that allowed Indian cement
manufacturers to compete with foreign producers rather than each other. Cement as an
industry struggled to survive without the government’s support.

While the ICMA brought relative stability to the market, it also entailed the
industry’s consolidation in the hands of larger companies with greater financial means and
gave control of the construction industry to the industrial magnates of the country. In the
years that followed, the Cement Association of India and the Cement Marketing Association
were formed and focused on increasing cement consumption in the market. In 1936, eleven

cement manufacturers came together, voluntarily liquidated themselves, and formed the Associated Cement Corporation (ACC). This merger made the spatial distribution of cement more efficient and monopolized the cement industry to a certain extent. ACC was one of the biggest companies in the country at the time and remained so through the early decades of independence. Because cement production was dependent on limestone deposits, the ACC hoped to rationalize the sites of production and construction, rather than have these sites compete between themselves under different management. The merger also allowed ACC to market cement to its advantage and grow its consumer base. Yet cement production in the colony could not meet demand and companies still struggled to increase capacity.

Cement for the Bhakra Dam was supplied by ACC’s Surajpur plant, named the Bhupendra Cement Works after the Maharaja of Patiala, who, in 1939, inaugurated the last plant to be built in a princely state. Partition is woven into the narrative of this cement company, which had to be divided based on where plants were. The Bhupendra Cement Works arranged for a train to take its daily-wage laborers across the border and an airplane to transport its monthly salaried staff. The entire operation was supervised by managers and employees, yet the plant itself underwent partition and one incident of violence is on record. Upon hearing of the violence meted out to refugees entering India, a gang massacred a bus load of Muslim employees being evacuated to Pakistan.41 This incident further marked the entanglement between cement and nationalism.

Between 1947 and 1952, the infrastructure for dam-building was constructed: all-weather metaled road was laid down and the broad gauge railway line was built from Ropar, the urban node, to Nangal and then up to the Bhakra Dam site. Excavation began for the

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41 Ibid., 108.
diversion tunnels and a “modern colony to house about 10,000 engineers and workmen was set up at Nangal, along with guest-houses, schools, hospitals, laboratories and offices.”

One of the laboratories of which Randhawa wrote was the Concrete Research Laboratory at Nangal, instituted for the testing and control of the material prepared for the project. The key to pouring five million cubic yards of concrete was that the “complicated inter-dependent system of machinery” needed to be in place beforehand so that the concreting process could be performed continuously. Two systems of transport had to be set up: one for the aggregate that arrived from Neilla and was transferred up a conveyor belt, and the other from Surajpur. Cement was brought on hopper-bottomed wagons on the North West Railway lines via Ropar and then pumped up to the site using kinyon dry cement pumps (see Figure 2.7).

Figure 2.7. This image shows the process by which cement and aggregate was delivered from the railway station at Ropar, across the river, and to the construction site for the dam.


43 “Concrete Manufacture, Handling and Control at Bhakra Dam.”
Unlike masonry, cement was linked to mechanization. Hattiangadi, the Technical Director of the Cement Agencies\textsuperscript{44} observed this in a \textit{Times of India} article on the development of the cement industry in India. He argued that cement production in India was much lower than in the US or in Europe because of the lack of mechanization. Since Indian producers had to use more labor, cement actually became more expensive, triggering price rises across the concatenated chain of industries that depended on cement production.\textsuperscript{45}

The idea of natural resources as the only source of wealth appears in this article. Hattiangadi wrote that, although the country had been touted to be a vast reserve of untapped resources, reports of limestone deposits tended to disappoint in their actual quantity.\textsuperscript{46} Given this real lack compared to deposits in first world countries like Japan, he speculated that “nature has actually stinted in the distribution of this essential raw material for the manufacture of Portland cement.”\textsuperscript{47} This observation posed a material obstacle to the developmental imagination of untapped nature that characterized so much of the colonial conquest of the world. Hattiangadi recommended that the cement industry had to creatively circumvent these geographical and material betrayals. In lieu of quick mechanization, training people to work with substandard limestone offered one avenue, but synthesizing \textit{puzzolanas}

\textsuperscript{44} The Cement Agency was a body constituted to liaison with the state’s bureaucracy of the government in an increasingly controlled industry.
\textsuperscript{46} Meghnad Saha had once commented that the root cause of famine and malnutrition is the low productivity of Indian soil.
\textsuperscript{47} Ibid., 9.
became an important experimental effort to substitute a material that was abundant in the subcontinent for cement.\textsuperscript{48}

Fertilizer and cement are connected: the carbonate sludge produced by the fertilizer industry provided a raw material for the cement industry. The \textit{Indian Concrete Journal} reported,

\begin{quote}
like the quality of mercy this carbonate sludge blesses both the giver and the taker! For the fertiliser factory it solved a big disposal problem and for the manufacturer it provides one of the chief raw materials for the manufacture of cement. There is also a third advantage—and that is that the money raised from the sale of calcium carbonate sludge to ACC helps to reduce to a sizable extent the price that the farmer has to pay for the fertilizer.\textsuperscript{49}
\end{quote}

This poetic view of balance overstated the mutuality of the agreement. ACC framed as corporate sacrifice the fact that it absorbed the costs of the transport and management of the sludge that made the fertilizer cheaper. Cement and fertilizer were both site specific, high in capital investment, and required huge energy input and low labor; both were commodities with which to make more commodities. Further, both industries depended on a unified and developed political geography, where these remote sites were connected to their urban and

\textsuperscript{48} Amy Slaton, writing on the development of the concrete industry and expertise in the United States in the twentieth century, pays attention to the political agendas behind concrete which can occupy a wholly apolitical imagination. Amy E. Slaton, \textit{Reinforced Concrete and the Modernization of American Building, 1900-1930} (Baltimore: The Johns Hopkins University Press, 2001). In a similar vein, the \textit{Indian Concrete Journal} was thinly veiled propaganda for the concrete industry. Not only the institutions of the state, but also the idea of nationalism itself was linked to the concrete industry. The nationalism of the spot of cricket is an instance where this nationalism of cement-concrete played out. Cement companies would retired cricketers and sponsor the game. This was formally captured in the construction of a giant cricket bat: “A giant concrete cricket bat at Indore: a giant concrete bat about 12.5m high and 2.13m wide, stands in a public park in Indore as tribute to India’s cricketing prowess. ‘May Indian cricket ever remain bat in hand’ reads the inscription above the signatures of the cricket players in Hindi. The cost of the bat was about Rs. 11,000. The architects were Messrs. Shamsi and Shamsi, of Indore, and the contractor Mr. Govind Ram, also of Indore.” “News from the States, Madhya Pradesh,” \textit{Indian Concrete Journal} 47, no. 7 (July 1973): 249. Synthesizing puzzolanas also worked as a nationalist research project to look for substitutes to cement. See Khorakiwala, Ateya. “A Black Carpet of Bitumen; Public Works as Research, India C. 1960.” Unpublished.

\textsuperscript{49} \textit{Indian Concrete Journal} v. 30, quoted in Chaturvedi and Chaturvedi 1997, 19.
agricultural points of consumption. As a result, both fertilizer and cement offered the opportunity to design model townships and import garden cities into the country.

Let me return to the propaganda pieces published on August 15th:

High dams cannot be built in traditional materials because of the abnormal stresses which develop in the body of the dam and the complex nature and location of such stresses. … Manual labour is also out of the question for the construction of such structures—it may take decades for manual labour to build a structure like the Bhakra dam with the consequent immense wastage of expenditure and the holding up of for (sic) a number of years, on the returns from the project. In fact, concrete and mechanization go together on projects of such magnitude.  

Why this propaganda, arguing for the necessity for concrete? Engineers stressed the peculiarities of Bhakra; because it was in a gorge, at a high altitude, concrete was to be mechanically placed. Manual labor was too inefficient and slow, given the quantities of wet concrete handled on a daily basis. However, this obscured the fact that even the machines needed people to operate them: that is, even with machines involved, the dam was built using human labor, albeit skilled labor. Yet, while the dam was built with skilled labor, the canals were largely constructed with unskilled labor.  

Paradoxically, Nehru dedicated the dam to the laborers who built it, but, in their journals, experts wrote as if the dam would be built without manual labor.  

Through the language of cement, concrete, and expertise, labor was represented as an obstacle in the discourse of modernity. No matter that laborers did a huge amount of work around the dam—such as constructing model towns and metaled roads and bringing machines to the site itself. In the technical language of cement and concrete manufacture and placing,

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51 Raj, Some Economic Aspects of the Bhakra Nangal Project; a Preliminary Analysis in Terms of Selected Investment Criteria., 73.
labor needed to be excised: labor is inefficient and slow, labor is the reason Indian cement is expensive—labor, in short, is the problem. So labor, which brought the material Third World state into being, was constructed by technocrats as “overpopulation” rather than as an extensive resource.

Temple of Modern India

In 1952, a newspaper article chronicling the Bhakra Nangal project contended that “the State as a whole is a ward of the Project. It has sacrificed much to make Bhakra possible. But it can aspire to great consequential benefits.”

What is the “state” that the author refers to? And what is this odd relationship in which the state is a “ward” of the dam? The article captured the central government’s involvement in the infrastructural project through its various commissions, control board, and other boards. Nehru’s support for the project set the tone, but his role in the Bhakra Dam project is often reduced to a synecdoche for the Nehruvian model of development—that is, his commitment to development through big science, technology, and industry. However, Nehru’s relationship with dams is not as obvious as it has been made to seem in the popular imagination. In 1958, again to the CBIP, Nehru said,

For some time past, however, I have been beginning to think that we are suffering from what we may call, “disease of gigantism.” We want to show that we can build big dams and do big things. This is a dangerous outlook developing in India. I want our engineers to undertake big schemes in the country, but the idea of having big undertaking and doing big tasks for the sake of showing that we can do big things is not a good outlook at all.

Dams allowed Nehru a space outside of Delhi politics, where power coalesced. Although he had complicated sentiments around dam building, one of the most persistent phrases

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52 Our Special Correspondent, “Rivers In Harness: IV -- Giant Dam At Bhakra,” The Times of India (1861-Current), June 5, 1952.
associated with the Bhakra Dam is Nehru’s reference to it as a “temple of modern India.” This fragment has become a shorthand for the dense intersection between Nehruvian India and development theory. It is both claimed as a nationalist mantra of progress and lobbed as critique of its failure.\footnote{An entire sentence is usually attributed to sum up the grand ambitions imagined for the infrastructural project: “The Bhakra Nangal Project is something tremendous, something stupendous, something which shakes you up when you see it. Bhakra, the new temple of resurgent India, is the symbol of India's progress.” This sentence is quoted on the Bhakra Nangal website itself (http://bhakranangaldam.com) and in the opening pages of a book by its main critics. See Shripad Dharmadhikary, Swathi Sheshadri, and Rehmat, \textit{Unravelling Bhakra; Assessing The Temple Of Resurgent India} (Badwani, MP: Manthan Adhyayan Kendra, 2005).} However, there is no clear record of this quotation, or when and where Nehru may have said it. Instead, in Nehru’s speeches and writings, the phrase comes through in multiple forms and with varying textures and meanings and it is not amenable to simplistic explanation. The speeches Nehru gave at the meetings of the Central Board of Irrigation and Power (CBIP) and at the dams themselves offer clues to this problem. He came to the analogy between temples and dams very early on, in 1948, and, in his speeches, one can track the first conception of this analogy and its subsequent iterations and refinements quite clearly.

Nehru first compares temples and dams in a 1948 speech given at the Nineteenth Annual meeting of CBIP, the first held in an independent India. In this speech, Nehru articulated a teleological conception of history in which man moves from building small useful works, such as channels to bring water to his fields, to the height of cultural production—cathedrals, temples, and other monumental works of beauty. India’s position in this teleology constitutes a somewhat backwards movement: we have been a great civilization, Nehru said, but in the present moment, we cannot afford to build monuments. Instead, we need to build public works.
Nehru’s consideration of public works somewhat mirrors Rudyard Kipling’s thematic twist, “Bid thee build the hag her bridge and put our mosque from out thy mind / So ’twas built, and Allah blessed it; and, through earthquake, flood, and sword, / Still the bridge his Viceroy builded throws her arch o’er Akbar's Ford!” Kipling here substitutes of one type of building for another—or rather, exchanges one solution for another. Both imaginations connected architecture and public works, with lessons for development.

Nehru’s speech swung back and forth between the “multitude of problems” ahead and the “tremendous power locked up as in the Himalayas.” As a signifier of strength and capacity, the Himalayas were the inverse of the mountain of problems facing the country. The vast and deeply differentiated issues confronting the capital-scarce state made it difficult to instrumentalize the locked up powers and address these “accumulated problems.” But after his calls to engineers to develop instrumental capacity, Nehru shifted focus and responded to A. N. Khosla’s address from earlier that same day. Khosla was the chief engineer of India’s dam building project, and Nehru agreed with him that certainly there was a tremendous burden on India’s engineers—yet he hoped that there was also something else. Nehru said, “we also want you to infuse your work with something, some higher spirit on doing a fine creative job, with some fulfillment of objectives and ideals, that immediately infuses into your work something which is bigger than you.”

57 Ibid., 2(d).
Nehru synthesized the burden of engineering with the spirit of creativity. He invoked “the remains of ancient buildings, ancient structures, temples, cathedrals, mosques, and the like,” which were made by “fine builders, fine engineers, but [also] men of faith in their work.” And so Nehru made his case:

No man can build or construct anything just beautiful unless he has full faith in him. See the magnificent cathedrals of Europe. People seldom know who were their builders but we do know, because the evidence is there for our eyes to see that the embodiment of faith of the builder is the engineer. So also our great temples and mosques and other buildings. Now we do live in a different age. We do not spend much time on mosques, cathedrals and temples, but in other types of public works. But those public works should also be fine and beautiful because there is that faith. Magnificent architecture was such because it was built with conviction. Engineered infrastructure, then, could be magnificent even when not beautiful—but only if it were built with conviction. In effect, what Nehru said here was this: unfortunately, the Indian state does not have the resources to build beautiful things, but instead we can build useful things, and if we build these with conviction, they have the capacity to be magnificent as well.

Public works, in a sense, fall outside the long history of aesthetic development. They are not a milestone in the synthetic development of the building arts. Yet Nehru insisted that infrastructure had something that could move the mind and offer it courage, as he discusses elsewhere. The power that lies behind faith is a latent power, and the public work becomes a way to instrumentalize that power, somewhat analogously to the way in which a temple might instrumentalize the power of god for the benefit of the people. This was perhaps Nehru’s first iteration of the analogy of dam and temple—though note that it is not “the dam” but “public works,” and it is not “the temple” but rather “great temples and mosques and other buildings.”

58 Nehru “Nineteenth Annual Meeting of CBIP: December 5 1948,” Modern Temples of India., 2(d).
The second iteration of this analogy came in 1954, at the opening and inauguration of the Nangal Canal. Here Nehru spoke in Hindi and built upon his previous analogy of public works:

We are tasked with many problems. Many tasks still remain to be addressed, and so I looked at it [the Bhakra dam], and I went around and looked some more, and I thought, that in these times, perhaps the biggest temples, and mosques, and gurdwaras are those places where man works for the benefit [good] of man. [In a low voice] what other place can be bigger [more important] than this Bhakra Nangal, where thousands and lakhs of men have worked, toiled, bled, so far as given their lives, what place can be more pure and holy, this is what you think standing here. [the audience claps]. Then my thoughts went in another direction.59

Here Nehru refines his previous position: perhaps a place of benefit to mankind is what a temple is, and, if that is the case, then wherever we find benefit we could think of it as a temple. So perhaps the dam, where there has been so much sacrifice and there will be so much benefit, is the temple. Far from the dam as a technopolitical site of secular worship, it was the coagulated labor that, for Nehru, corresponded to holiness. Nehru articulated the secular as labor: secularism was when man did for man what otherwise only religion—or god—could do.

In 1963, at the inauguration of the Bhakra Dam, Nehru said, “I thought that in these times perhaps the biggest temples and mosques and gurdwaras are those places, where man works for the good of man.”60 He reconfigured what he had said at the opening of the Nangal Dam:

At Nangal I said that these days India’s mosques, temples, gurudwara, are dams, these things are being made. In this regard I had said that those things that man makes with his hard work, for the

60 Nehru, “Bhakra Dam Opening” Modern Temples of India,(New Delhi: Central Board of Irrigation and Power, New Delhi, 1989), 97.
benefit of man, those are the kinds of things that we should care about, that we should worship. So this temple, or gurudwara, or mosque, whatever you may call it, you have completed it.\textsuperscript{61}

In this sentence, Nehru comes closest to the analogy between the mosque/temple/gurudwara and the dam. Instead of building places of worship, we are building things that benefit mankind. So the dam is now a temple in the sense that it is a place of faith and care: faith in the work we do for ourselves and care for that which we consider valuable. Nehru’s tone was continually reflective and uncertain. He hedged his analogy with cautionary phrases, like “whatever you may call it…,” “perhaps,” and “I am afraid I am just meandering in my thoughts and ideas.”\textsuperscript{62} In writing of Nehru’s conflicted relationship with dams, his biographer, Sarvepalli Gopal, reported that “at the end of 1956, surveying the large Bhakra Nangal dam [Nehru] had whispered to himself, ‘These are the new temples of India where I worship.’” As evidence, Gopal cites an article in \textit{The Hindu} which hardly resembles the grand statement that the analogy is now usually taken to be.\textsuperscript{63}

Nehru’s image of the dam as a coagulation of labor that we should hold in spiritual regard has been transformed into the hard claim that the dam is the temple of modern India. This rhetorical transformation concretizes the act of exchange. In the corrupted, simplified, re-iterated version of Nehru’s analogy, the dam and temple replace each other over and over again through the linking verb “is.” With Nehru’s qualifications removed, the perverse sentence makes dam and temple fungible and equal, eliminating the role of labor in both cases. Whereas Nehru invoked public works, cathedrals, mosques, and gurdwaras through the laborers who built them, here in the hard, concretized version of his analogy, these structures

\textsuperscript{61} Ibid, 97.
\textsuperscript{62} Jawaharlal Nehru, “Nineteenth Annual Meeting of CBIP, December 5, 1948,” \textit{Modern Temples of India}, 2(d).
\textsuperscript{63} Gopal, \textit{Jawaharlal Nehru}, 3:111.
are instead invoked in terms of their consumers: the people who prayed in them, those who benefited from electricity.

Several erasures occurred in the shift from “these days in India mosques, temples, gurudwara, are dams” to “dams are the temples of modern India.” The first was the elision of masjid (mosque) and gurudwara (the Sikh place of worship). The second was the elision of Nehru’s tentative tone. Finally, labor was erased as the link between the two categories of structure. These three erasures were fundamentally important in how the meaning of this statement was altered and used to encompass everything that Nehru meant and stood for. The transformation of Nehru’s analogy from labor to temple covers the distance between Nehru the man and what we now consider to be Nehruvian. To what end did this transformation occur? For whose benefit did these erasures work?

The shift in meaning was a precisely governmental operation, one that Nehru acknowledged and allowed. Meaning shifted in response to what the state needed it to be, traversing the distance back and forth between Nehru and Nehruvian. Spivak has argued that translation is both a continual back and forth and impossible, since it involves the loss of the “I” subject and the production of the translator-subject in the act of translation. When Nehru’s words were translated into “Nehruvian,” Nehru himself became an ideal translator-subject in Spivak’s sense—he uttered the phrase, oversaw its translation, and still had little control over its shifting meaning. “Mandir-masjid-gurudwara” became “temple” because of a recalibration of the political weight of multiple spaces of worship and because it was

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translated into an English word with a Latin origin.\textsuperscript{65} Spivak argues that translation echoes the form of exchange: it is an action in which two texts are brought into some kind of equivalence so that one can replace the other. The sentence that appears over and over again in place of loquacious excerpts from Nehru’s speeches brings together two fragments, the first about the dam as temple and the second about the dam as a symbol of progress. As much as Nehru did not say “the dam is the temple of modern India,” he also did not exactly say “the dam is a symbol of progress.” Instead, he said,

\begin{quote}
it held a special place in my heart because it is a prototype/model [namuna] for India’s progress, and for Punjab’s progress, and today that I am here, I cannot say of it that it is complete, the electricity portion is still remaining, but one big, weighty [bhaari] portion is complete, and is working, and we can reap the benefits.
\end{quote}

He used the words symbol (nishani) and progress (tarraki) often in the speech, but this was the closest that they come together to mean “a symbol of progress.”\textsuperscript{66} They come close at another point as well, where he says, “this dam and all these things surrounding it, they act as markers [nishani] in front of me, of India’s progress.” Both quotes also indicate the tone with which Nehru articulated this thought—not as a proclamation, but rather as a suggestion, as one of the many considerations that he was contemplating.

In fact, rather than “temple as dam,” it was “symbol of progress” that first captured the headlines of newspapers (see Figure 2.8). The \textit{Times of India} titled its report on the inauguration: “Bhakra Dam Dedicated to Nation by Nehru; ‘Project, A Symbol of Our

\begin{flushright}

\end{flushright}
The article mentions no temples or mosques or gurdwaras and sticks to the congratulations offered to those working on the project, while reporting the quantitative value that the project would bring to Punjab and the country.

The succinct phrase “Bhakra, the new temple of resurgent India, is the symbol of India's progress” implies a very different relationship between dam, labor, and decolonization than the unwieldy sentence, “this temple, or gurudwara, or mosque, whatever you may call it, you have completed it” (emphasis mine). The hard sentence has popularly been understood as Nehru’s attempt to shift India’s focus from the religious to the secular and signal the ascendance of science over superstition. Here the divine source of the river is replaced by the technological source of the dam. But the sentence is laced with extra meaning: it could be telling India to worship at the dam, which now became some sort of techno-aesthetic god. While these meanings were not what Nehru intended, they continue to resonate within the echo chambers of India’s technocracy: that Nehru believed dams were India’s modern temples.

**A Symbol of Progress and the Two Heads of the Sovereign**

In 1964, the Films Division of India produced a documentary on the Bhakra Nangal multipurpose river valley project called *A Symbol of Progress*. The title came from Nehru’s dedication at the Bhakra in 1963 (see Figure 2.8), and the documentary mirrors of many of Nehru’s concerns and ideas. Yet the film also moves between what Nehru said and how he was heard. It traverses the distance between Nehru the man and the Nehruvian model of development. In a sense, the film reveals the two bodies of the Hobbesian king: Nehru the

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68 Ibid.
economic planner, whose project was underpinned by aesthetics, and Nehru the prime minister, who represented the democratic-developmental state.

Figure 2.8. Headline in the *Times of India*, October 23, 1963. The Times of India News Service, 1963.

The film begins with its title written out in five different languages: English, Kannada, Tamil, Telugu, and Malayalam. Usually the same reel would be dubbed in each of these languages and then played to an audience in a local language. This system, devised to work around the language barrier, became a defining aesthetic of news reels: the voice of god voiceover. The technique was, to a large extent, an artifact of recording technologies and the mode of distribution of films. In the early years, the Films Division of India (FDI) did not own the necessary equipment and collecting sound at interviews was a difficult proposition. Only with the acquisition of Nagra quarter inch synch tape recording technology in the late 1960s did interviewing improve. Like news reels, films were also distributed to regions across the country to be screened to audiences in a variety of languages. The FDI had a department that Jag Mohan proudly called a “miniature India” of translators and narrators.69 The Script and Commentary Department, which began with five languages—English, Hindi, Bengali, Tamil, and Telugu—made possible the multiple versions of each reel, and by 1960, they had expanded to fourteen languages. The narration is an artifact of translation.

In the opening sequence the camera follows a man wearing a hard hat, walking towards something that we cannot yet see. He stops, and the camera zooms in on his face, at which point the voiceover breaks in, “Moolraj Sharma has been a construction worker here for seventeen years.” The camera cuts and now we turn to see what Sharma is looking at: a plaque in raised letters, written in Hindi, dedicated to workers who “laid down their lives in the performance of their duty.” The camera begins to dolly out. We now see Sharma looking at the plaque while the camera begins to pan right. “Close at hand is another memorial, a memorial of their own creation,” says the narration, the pan shoots past Sharma, who we will never see again, and the voiceover continues, “the massive Bhakra dam. A symbol of progress dedicated to the people of India.” Given that he dedicated the Bhakra dam not just to the country but especially to the workers who built it, to their “blood and sweat,” the opening shot of a worker is a tribute to Nehru’s imagination of the project as training ground for the skill and imagination of the new Indian subject. The plaque in the film’s opening comes directly from the end of Nehru’s speech, where he had suggested that a memorial be built beside the dam, dedicated to the people who died in its construction.

Having begun with a tribute to Nehru, the film quickly moves on to its purpose as a marketing project for the state. I have spent quite some time explaining how scarcity was both a tool of classical economics and a developmental ideology, and this doubleness comes home to roost in this film and, more broadly, in the cultural production of this period. “Before Bhakra, water, electricity… all were scarce. The future seemed bleak, till Bhakra rose bringing the blessings of its water.” There is much ideology in this film, but it is particularly clear in this sentence, where scarcity is a lack, a hole that material infrastructure—literally matter, mass, concrete—fills.
The film uses two tropes that map onto narratives of development. The first is sacrifice. As we have seen, the film opens with the workers whose lives were sacrificed; it also mentions the villages that were sacrificed, each of which was then given a memorial so it may never be forgotten: “the Sutlej has been harnessed. The tiny village of Bhakra perished in the waters of the Gobind Sagar lake, to be immortalized by a newer and a bigger Bhakra.”

The second is waste. The film characterizes the river itself this way: “its precious waters flowed into the sea, unused, wasted.” Waste is a key trope that runs through the language of development. It is a corollary to scarcity: nature has provided us plenty, scarcity is manmade, and nature needs to be harnessed. Here again is the act of translation; the nation is in a continuous state of translation. From Hindi to English, from English into other languages—and, like a game of Chinese whispers, meaning is not only altered, but rather made through translation. The dam, too, is an act of translation, in that it converts one kind of energy—potential energy of water in the mountains—into another, electricity for the developmental project.

A key moment of the mutation from Nehru to Nehruvian occurs when Nehru presses a button and water streams down the spillway, after which the camera cuts to serpentine concrete canals (see Figure 2.9). This is a crucial, climactic moment, where after fourteen long, hard years of construction, the dam finally begins to work. To underscore the point that Nehru brought water to the people, the camera cuts once more, to a man hacking at a bund abutting a stream to direct water into his field. But note Nehru’s view on this same moment in the speech he gave before pressing that button:

I have been told, just now the governor sahib explained that I press a button here and then water will come out with great force. In a little bit I will press it. [Laughter]
It is hard to convey the silly, joking manner in which Nehru delivered this sentence. He was making fun of the governor, who seemed fixated on Nehru’s task of pushing the button, but even more, he was making fun of himself because he was continually called to places to push buttons of great significance. He continued his speech in deliberate contrast to the humor of the previous sentence:

But the truth is that I came here to make my heart happy, by looking at this [applause] and to meet you and congratulate you. Particularly those of you who took part in working on this [applause].

In a sense, Nehru was acknowledging that there was some distance between what he said and what his audience heard and deemed important. He seemed to anticipate that every image of him at the dam would be an image of him pushing the button, and he proleptically displaced that representation of his Nehruvian self through humor. In mocking the fact that he would be continually represented as “pushing the button,” Nehru bridged the discrepancy between the man and the position, the person and the political office of prime ministership, with humor.

70 Modern Temples of India, 95.
71 Ibid, 95.
The dam came to symbolize many aspects of the independent state. If it was most obviously a symbol of progress, I contend that it was also a symbol of techno-modernity, a memorial of sacrifice, a monument to distribution or *nomos*—the spreading of wealth, and an icon of the potential of nature and of the young Indian state’s capacity to harness that potential. The state, as evidenced by the documentary, hoped it would be a symbol of the capacity and gift of labor. And crucially, the dam was a symbol of the power of quantification. The documentary, which was largely a marketing project for the dam, recounted in detail exactly how much concrete was spent in making the dam (five million cubic meters), how much of it was poured in an hour, twenty-four hours a day, continually for seven years (400 tons), how much land in Punjab and Rajasthan were consequently irrigated (800,000 hectares), the total installed capacity of the new Bhakra Nangal grid (1.2 million kilowatts), and how many fold the power output in Punjab increased (25). This quantified projection of the capacity and potentiality of the dam served the mythology of the Bhakra deeply: it very early on made a case for the tangible outcomes of the project.
The mythology of the Bhakra dam is somewhat different from its reality. While the mythology espouses a vast and productive harnessing, with diverse functions, the effects of the dam on ground are more complicated. A study by the Manthan Adhyayan Kendra, a watchdog group that focuses on water and energy issues in India, has attempted to take the Bhakra Nangal to task and assess whether the dam lives up to its mythological status. The report takes on the Bhakra project on its own terms, as a quantified infrastructural object. It presents data on agricultural production, irrigation, and power, making the very difficult attempt to trace the connections between the output of the dam and the agricultural production of the state. They argue that the amount of water that the dam reportedly stores and distributes is highly exaggerated and that the engineers of the dam knew and suppressed that fact. They note that dams tend to take a major toll on resources, such as concrete and foreign exchange, which, in a condition of scarcity, could have well been afforded to other projects that may have been more beneficial in terms of input. A lot of the money invested in the project went towards foreign experts: this money was literally lost to the Indian economy and sent to chase a fantastic project.

The second criticism they level against the Bhakra involves its command area. They show that Punjab was thoroughly well irrigated before the Bhakra, and it was dry tracts of land outside of Punjab, in Rajasthan and Haryana, that stood to benefit the most. They thus argue that the imagination of the dam is a distorted version of the actual project: Bhakra did not make Punjab the granary or the bread basket of India—rhetoric did.

Decolonization and Development

Ostensibly this object, the Bhakra, entailed psychological decolonization. It was Nandy’s transitional object that would guide colonial subjectivity to its modern recalibration.
But the Bhakra could also be critiqued for its technology transfer—that is, the way in which expertise was moved from the global North to the global South. Alongside this transfer of machinery and expertise, there was also a technology transfer in the realm of imagination and visual language. This is what dam-building projects were: a sort of transfer of imagination. What were the mechanisms by which ideas journeyed across oceans?

The dam was a crucial object in Third World politics. It was the figure through which the Third World could undo some of its dependence on the growing oil capitalism that was slowly choking its foreign exchange. Multipurpose projects in this regard doubly aimed to wrest some semblance of power back from a preponderant United States, while gaining ground in political support from the peasantry.

The dam was thus also a technological means on which to build alliances that were not routed through England and the United States. India was reliant on imports for the major commodities upon which nation building was founded: concrete, fertilizer, oil. Of these, oil, as Timothy Mitchell has pointed out, became a substance whose flows, when controlled, wielded power. Mitchell puts oil in contrast to coal, whose extractive technologies allowed groups with differing interests to exercise control over, or interrupt, the flow of energy, and thus enabled unionized labor politics. While Mitchell does not see water as part of this mode, the formal similarity between control of the flow of oil and the flow of water is important, as are the attendant ramifications for democratic process. David Gilmartin suggests that the Indian bureaucracy that emerged around water management tends towards Wittfogel’s

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hydraulic managerial state. The hydroelectric dam promised infinite energy through technical expertise, giving the Third World a foundation upon which to build itself.

The project of decolonization became a project to create the Third World: a utopian political condition in which, through solidarity, an economically and politically non-dominant state could assert its autonomy. Contrary to the Nye’s American dam construction site which immediately became a place to visit and picnic, the Indian dam, and particularly the Bhakra in its proximity to the capital, became a site for Third World politics. President Ho Chi-Minh was escorted to the dam with Nehru in 1958, and the Ghanaian leader Kwame Nkrumah visited later that year. Shukri Al-Kuwatly, then President of Syria, was also taken to the dam. Bhakra was the site on which these friendships were staged for the world. The official archive is rife with photos in which foreign delegations stand atop the gorge, alongside Indian hosts, pointing down at the changing landscape. Conversely, Nehru also visited the construction of the Aswan Dam with Gamel Abdul Nasser. Visiting the Aswan Dam was a significant gesture within the oeuvre of decolonization because it countered the hierarchy and structure of the British, colonial state. Nasser had foreign leaders set off the dynamite to level the earth upon which the infrastructure would be built: they literally leveled the ground upon which a politics of the Third World could take shape. Articles in the Times of India and The Hindu again

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73 Gilmartin, Blood and Water, 182.
75 Representations of the landscape continually involve drawing directional relationships, views alongside viewers and vantage points. The crucial question that follows is: who was pointing, and who was pointed at? While in the picturesque view of the ruin, specifically those made in India, the viewer was left outside the frame of the image, in the infrastructural picturesque, the viewer was often included in the photo. And even more often the camera was turned with its back to the view, photographing only the viewer. Perhaps this is what decolonization meant: we can now do the pointing.
76 “India's Prime Minister Mr. Nehru detonated at Aswan on May 17 eight tons of dynamite, exploding a mound of rocks to inaugurate the work on the diversion channel of the Aswan High Dam in Cairo. He said the high dam would bring prosperity to the Egyptian people. Hundreds of wildly cheering Nubians greeted Mr. Nehru with slogans of ‘Long Live Nehru’ as he inaugurated the diversion canal. As Mr. Nehru pressed
captured the “button pressing” avatar Nehru, lifting tons of granite into the sky with the touch of his finger: 77

Mr. Nehru arrived in Luxor by air today to see ancient sites and monuments, Cairo Radio reported in an Arabic broadcast. The Indian Prime Minister yesterday detonated eight tons of dynamite on the diversion canal of the Aswan high dam. As Mr. Nehru pressed the electric button, 20,000 tons of granite rock and earth were lifted into the sky in a grand spectacle. In a brief speech Mr. Nehru voiced the hope that the high dam would bring prosperity to the people of Egypt. In the evening Mr. Nehru went on a cruise in the Nile.

The dam became an ideological and mythological thing; it was a transitional object meant to catalyze healing after centuries of colonial pillaging and the tragedy of violent partition. The dam was the necessary public work through which the state actualized itself and made itself visible to the public. The barrage was the iconic object that embodied and materialized the desire of the state and the state’s vision of itself. The dam was a symbol of consent, legitimation, development, and modernity. Any critique of the dam was a critique of the nation itself and an attack on the process of self-determination; these high stakes rendered critiques impossible. 78

In conclusion, Bhakra came into being as the apotheosis of a long process of transforming the Punjabi landscape, even while it was appropriated by both Punjab and India as a symbol of progress.

77 PTI, “Mr. Nehru in Luxor; London May 18,” The Times of India (1861-Current); New Delhi, India, May 19, 1960.
78 Ashis Nandy, The Romance of the State: And the Fate of Dissent in the Tropics (Oxford University Press, USA, 2007).
Chapter Three

Models and Model Townships

What is a model? The *Oxford English Dictionary* offers four different meanings, two of which are relevant here. The first is “a three-dimensional representation of a person or thing or of a proposed structure, typically on a smaller scale than the original,” and the second is “a system or thing used as an example to follow or imitate.” The second of these two meanings was a central ideological feature of the Nehruvian state. The textual and built archive of the 1950s and 60s in India is rife with models: model towns, model villages, model factories, model projects, and so on. There are also physical models from this time. This chapter examines model making. Not only did they model architecture, they also made working models of infrastructure, and, moreover, actual projects were continually referred to as models—model towns, model villages, and model projects.

One of the most famous images of model making is the image of Giani Rattan Singh bending over a model of Le Corbusier’s Secretariat in Chandigarh. The model was huge and
detailed; on first glance, it is hard to recognize it as a model. It seems to be a building. From the white, washed-out sky in the background, Giani Rattan Singh, the model maker, is slowly revealed: the viewer sees a hand—a large, out of scale hand—then a beard, and then a face, emerging from the white of the sky. Then the white edge of the turban becomes clear. Rattan Singh appears, godlike, from the sky, tinkering with the earth. The image captures the model as a manipulable scale in which conditions can be controlled and remade with relative ease (see Figure 3.1).

![Figure 3.1. Giani Rattan Singh working on a model of the Secretariat. Image from the Chandigarh Museum, Chandigarh.](image)

What was being modeled? What was the project? I argue that these models, and the language of modeling, provided a way of thinking about an alternate future within the context of a difficult and attenuated present. The models imagined a technocratic future in which there was total efficiency, perfect bureaucracy, and total information. Model making meant that the artisan (karigar) had to be an engineer, and the engineer had to be an artisan. Scientists learnt about non-structural materials, and artisans had to learn to read survey maps. The model in
miniature could not help but become a metaphor for the model state, as the state of Punjab itself had become a model for the rest of the country, and Bhakra a model for all other dams. Furthermore, models could circulate in a way in which the public works themselves could not (Figure 3.2 and 3.3). This chapter brings together different iterations of modeling through the framework of hydraulic research and model townships, to ask how models, as both objects of experiment and metaphors of perfection, came to be crucial elements of science in the developmental state.

![Image of students looking at a model of the Nangal Dam](image)

Figure 3.2. “India—1958” Exhibition, Delhi. Students looking at a model of the Nangal Dam. The Hindustan Steel Pavilion is in the Background. 1958. Photo Division, Ministry of Information and Broadcasting, Government of India.

Models perform many tasks, one of which is representation. Physical models replicate a system in miniature (or sometimes magnify a system) in order to represent some important relationship within that system. Crucially, in this kind of replication, the system is
stripped down to its essential features, and these essential features are scaled. As a result, physical models instantiate the essential values of a system, isolated and bounded off from trivial or unnecessary complications.

Figure 3.3. An image of the Bhakra Dam at the “India—1958” exhibitions in Delhi. The model was a part of the Irrigation and Power pavilion in the exhibition grounds. “The Prime Minister, Shri Jawaharlal Nehru, formally opened before Indian and foreign visitors the India 1958 exhibition on October 8, 1958, which depicted India’s industrial, technological and scientific progress since Independence.” 1958. Photo Division, Ministry of Information and Broadcasting, Government of India.

A classic example of the representational task of modeling is Neils Bohr’s model of the structure of an atom. In this case, argue Margaret Morrison and Mary Morgan, Bohr’s model falls into the “analogical” category of models—that is, in his model, an electron is analogous to a billiard ball.¹ Scholars have recently argued that models, when considered as

¹ Mary S. Morgan and Margaret Morrison, Models as Mediators: Perspectives on Natural and Social Science (Cambridge University Press, 1999), 5.
scaled representations of the truth about other systems, fail in this task on many counts. Bohr’s model, for instance, relies on a metaphorical relationship between elements of the model to understand what atoms are like. Rather than taking a model to represent a truth, scholars like Morrison and Morgan instead argue that models should be considered autonomous entities—not epigones of truth, but rather systems with their own internal coherences. These coherent knowledge systems are their own sources of knowledge: that is, the models produce their own independent realities in which certain truths can be agreed upon. These models then mediate between that local truth and the larger generalized theory.

Philosopher Max Black’s *Models and Metaphors* (1962) interrogates models alongside linguistic constructions, such as metaphors. Hydraulic models fall into the scaled model category in Max Black’s classification of model types. That is, hydraulic models scale down large hydraulic objects; when these are working models, they also scale down the forces acting on the structure. In his chapter, “Models and Archetypes,” Black presents two dominant views of what models are supposed to do: according to the first, they are instruments of representation and measurement, while, according to the second, models are instantiations of theory, inferior moments of representation in the understanding of knowledge. Black then proposes a third possibility: that a model is a heuristic fiction that allows for some intuitive grasp of knowledge—a gestalt knowledge—that is not simply about seeing a representation of a system, but that allows us to describe knowledge where current language fails. In this way, the model is like a metaphor because a metaphor can produce meaning where language fails to convey complete meaning. Metaphors always produce an

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2 Ibid, 5.

excess of meaning and thus become their own sources of knowledge; Black argues that this applies to models as well.

Central to Black’s argument that models operate at the edge of knowledge is the implication that we model in a condition of lack. Modelling is the act of projecting an unknown entity. If all the variables were known, then we wouldn’t need to model.

Hydraulic Engineering Models

Hydraulics is an elusive science. Its laws are limited in their application to definite sets of conditions, and when one of those conditions is altered, a law perfectly good otherwise, is no longer applicable. It is difficult to avoid the tendency to apply a rule or formula to a situation where it does not apply. To overcome the consequences of such tendencies, hydraulic structures are first examined on models where an attempt is made, as best as possible, to simulate conditions that exist in the original or the prototype.  

The models in hydraulic research came to be particularly important in the 1920s and 30s, as projects such as the Tennessee Valley Authority in the United States gained currency as a model for the liberal distribution of modernity and wealth to the rural American countryside. These laboratories found their way into colonial countries, where public works projects demanded more attention to different soil conditions and larger interventions with the increasing use of newer and more precise concrete mixes.

Hydraulic research marked postwar development discourse’s emphasis on a techno-scientific interpretation of political space and aesthetics. In refracting political problems of territory through the techno-scientific language of resource management, the fields of

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geography, geology, and water resources came to be central to the political project of the new state. Modeling allowed for miniature instantiations of this scientific state, which was often besieged by problems of scarcity, both economic and material, and by politics, both local and global.

Hydraulic engineering rose to prominence in the 1940s and 50s with the rise of dam-building projects around the world. In the 1940s and 50s, in India and globally, hydraulic engineering came to be central to postwar developmental science. In India, research on the subject had two goals at this time: first, to expand and upgrade a stunted irrigation network inherited from the colonial state in Punjab, pivoting it towards a modern, managed, and rational system of distribution, and second, to design and study high dams, weirs, barrages, undersluices, canal head regulators, and other hydraulic structures through models.

As canal building shifted into large dam-building projects, hydraulic research came to be crucial. Hydraulic research included the study of soil stability, the prevention of waterlogging and salination, and soil reclamation. The first research institute was set up in Bombay in 1916, the second in Poona in 1920. A large site for model research was set up in 1925 at the Khadakvasla Dam near Poona. Simultaneously, a station was set up in Lahore with a field station in Malikpur to address the alarming degree of waterlogging and salination of land in the state. In 1947, a new institute was set up in Amritsar, and Malikpur turned its attention to doing experiments for the construction and design of the Bhakra Dam.\(^6\)

The Malikpur Research station was located on the Upper Bari Doab Canal (UBDC) in the town of Malikpur, between miles five and seven of the UBDC, bounded on the west by

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\(^6\) Central Board of Irrigation, *Irrigation Research in India*, 6–7.
the Main Line Canal and on the east by the Farida Nagar Feeder (Figure 3.4). The Malikpur research station was connected to a parent irrigation research institute in Amritsar, which was created at partition when the original institute fell to Pakistan because it was in Lahore. The Amritsar version was ill-equipped, “but a well-led organization,” as an article described it: “That post-partition infant is not a patch on its parent at Lahore, so well housed, and well equipped with apparatus. But the latter is bereft of the highly-trained personnel which partition has mercifully placed at the disposal of the Amritsar institute.” The competitive national spirit, as evidenced in this article, was very much part of hydraulics in Punjab, where the next decade would see the negotiation of the Indus Water Treaty as a means of divvying up the waters of the west-flowing Himalayan rivers.

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8 Our Own Correspondent, “Malikpur Hydraulic Research Station,” *The Times of India (1861-Current)*, 1949, 8.
Their most notable models were those of the

Bhakra lake, the Euphrates River at Habbaniya, (Iraq), the Sutlej River at Nangal, Rupar, Harike and Ferozepur, the Jhelum River in Kashmir Valley and the Brahamputra River in Assam. Similarly, the Bhakra Dam Spillways and the Volute Syphon models are some of the biggest models ever examined anywhere.9

While most proud of the large working models of the Bhakra, the experiments conducted on the smaller feeder canals were important in calibrating instruments and testing designs. In general, the models helped solve problems of construction and design to economize and localize projects.

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The Bhakra Experiments

Extensive model tests were carried out under the guidance of Dr. H. L. Uppal. Model tests were carried out in well-equipped modern laboratories to forecast the behaviour of the prototype in actual operation and to tackle problems which defy mathematical analysis. These model experiments and research investigations saved considerable sums of money and ensured efficient and trouble-free working of several vital parts and features of the Bhakra project. (Figure 3.5)

Figure 3.5. The Malikpur research station. The outdoor physiographical model can be seen outside the building.

A number of important experiments were conducted in the 1950s with an eye towards the construction of the Bhakra dam. Most involved testing different designs to manage the forces created by the overflow on the spillway of the dam. The other experiments involved designs for a diversion tunnel, a method by which to reduce the length of a wall, and

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investigations into river outlets and emergency gates. These experiments were replicated at one of following: the Bureau of Reclamation in Denver, the Laboratoire dauphinois d’hydraulique Neyrpic in Grenoble, or the MAN Laboratory in West Germany. One of the experiments investigated using the left diversion tunnel, in addition to the spillway, for some of the overflow. This was an unorthodox proposal and thus required experimentation. A large model—1/36—was used for experiments, along with a composite model of 1/80, and given the results, the idea was abandoned.\textsuperscript{11}

The major experiment conducted in order to design the Bhakra dam dealt with its spillway. The problem with a dam’s spillway is that water overflowing from the reservoir into the river has a very high potential energy.\textsuperscript{12} This energy can damage the toe of the dam and erode the riverbed. Harbans Lal Uppal, director of the Land Reclamation, Irrigation and Power Research Institute, constructed three alternative spillway designs to determine which would be the most economic and effective solution. Three models at the scale of 1/44, where 1” represented 3’8” or 10mm represented approximately $\frac{1}{2}$ m, were constructed beside each other: a hydraulic jump apron, a submerged bucket, and a ski jump solution (Figure 3.6). The submerged bucket, the model showed, caused too much damage to the soil and the toe, and the ski jump type shot the water too far beyond the hard bedrock. The team developed a “double interacting jet energy dissipater” that is quite ingenious: the form at the foot of the spillway diverted the flow and shot water up at angles such that streams of water would hit each other and dissipate energy. “The tremendous jets tamed themselves mutually.”\textsuperscript{13}

\textsuperscript{12} Ibid., 20–23.
\textsuperscript{13} Ibid., 21.
Apart from the double jet energy dissipater, Uppal worked on designs for power units that would sit within the body of the dam. Uppal wrote:

It was proposed by a French engineer … that power units could be embodied in the Dam and the draft tubes could discharge water from the turbines into the silting basin or below the ski jump. Nine alternative designs were examined, but none was found suitable… After a series of experiments a new design was evolved. With these changes the design became feasible… The Grenoble Laboratory endorsed the design developed by the Punjab Irrigation and Power Institute. This design was, however, not adopted as it involved the construction of a wider spillway.\textsuperscript{14}

However, neither the double interacting jet energy dissipater nor the embodied power units were incorporated in the actual project. So experimentation allowed for testing out possibilities that were too expensive or needed technical capacity that the Indian government could not afford and did not have. Experimentation instantiated the ideal within the real.

\textsuperscript{14} Ibid, 21.
The biggest accident that occurred at the Bhakra involved a hoist chamber that cracked on August 8, 1959. The hoist chamber was thirty feet wide and sixty feet high, carved into the rock to house gates that would regulate water flow through the right diversion tunnel. This provision was made to provide water for irrigation before the dam was completed. The failure of the hoist chamber—Randhawa called the repair of it heroic—presented an urgent challenge to all the engineers associated with the project. The failure had caused a leakage, and water from the reservoir flowed through the tunnel and galleries at high speed, submerging and inundating the powerhouse at the mouth. Control of the discharge and access to the chamber were completely lost. The task was to plug this leak. Ten workers died in the accident; some had been monitoring the cracks in the hoist chamber and others were at the submerged power plant.

A. N. Khosla, the doyen of Indian hydraulics, was appointed to the mishap committee to the dissatisfaction of members of parliament, given his close connection to the project. In Randhawa’s telling of this story, Harvey Slocum, the American engineer who worked on the construction of Bhakra, suggested a controlled explosion to plug the tunnel with earth. Khosla deemed the blasting too dangerous, given the possibility of harming the foundations. “The Indian engineers at Bhakra preferred to adopt the traditional methods (i.e. dumping the required quantity of clay with the earth-moving equipment).” (An aside: Randhawa’s use of the word traditional, in this context, encapsulates the flexibility of the term and its capacity to be instrumental. Here, “traditional” played a performative role in allowing

16 “Nine Drowned at Bhakra Dam Site,” The Times of India (1861-Current); New Delhi, India, August 23, 1959. and “Committee to Inquire into Bhakra Mishap: Centre May Approve Appointment ‘The Times of India’ News Service,” The Times of India (1861-Current); New Delhi, India, August 24, 1959.
17 “Committee to Inquire into Bhakra Mishap.” The Times of India’ News Service,” The Times of India (1861-Current); New Delhi, India, August 24, 1959.
alternate management of the project. Implied here is the politics of giving this task to Slocum versus to Khosla.) ¹⁹ The navy and army were called upon to provide barges from which to perform this “Operation Closure.” ²⁰

Uppal, T. D. Gulhati, and Gajinder Singh used models to devise means of regaining control over the situation. They tested the “traditional” plugging idea on models at Malikpur. The plan was to dump blocks into the mouth to plug the tunnel. The question was, how big should the blocks be, and what order should they be dumped in? First, the team experimented with twenty-ton blocks, but the gaps between the large blocks allowed the water through at the same speed. “The crates or blocks distributed the big opening into a number of smaller openings,” allowing the same amount of water through. ²¹

In place of large precast blocks, the team decided to use smaller plastic crates, which they tested on the model. At the dam itself, they found that smaller crates collapsed under the pressure of the water. ²² Eventually, through work on both the model and the site, it was concluded that the twenty-ton blocks formed a good base for the plastic crates. On this, smaller graded material could be added: shingle, sand, and finally clay.

At one stage, a crater formed at the model’s tunnel mouth, sucking in all crates at a high velocity. Similar craters were found on site. Thus, the models had managed to correctly replicate the real conditions of soil and water to the extent that they were able to predict how the site would react. The solution decided on involved dumping plastic crates until the crater

¹⁹ The Times of India News Service, “Bureaucracy Blamed: Delay in Bhakra Dam Repairs,” The Times of India (1861-Current); New Delhi, India, October 1, 1959.
²⁰ “Task of Closing Right Tunnel: Army Unit at Bhakra,” The Times of India (1861-Current); New Delhi, India, September 16, 1959.
²¹ Uppal, “Research for Bhakra,” 22.
²² “Bhakra Repairs,” The Times of India (1861-Current); New Delhi, India, October 16, 1959.
formed, plugging the crater with the twenty-ton blocks, and then continuing with the crates.\textsuperscript{23} The tunnel was finally closed in February 1960. To quote Randhawa, “The closing of the tunnel and of the hoist chamber was a great engineering feat.”\textsuperscript{24} But the project was also a reminder that engineering knowledge was continually incomplete at the site in question. The assessment of the disaster by various tests on models and on site underscored the situated nature of engineering, which otherwise was imagined to function in a more abstract realm of calculation. It wasn’t simply that models resolved problems that defied mathematical analysis; rather, it was that the process of modeling itself helped engineers manage engineering.

The Malikpur station, however, was far more than an isolated model-testing field site. It represented a miniature geography of water resources and infrastructure in North India. The total area of the station was four hundred acres and it contained models of the Jhelum River in the Kashmir Valley and the Brahmaputra river in the Assam Valley (see Figure 3.4). The design made use of the site’s natural slope to feed the models of the river valleys. In fact, Uppal argued that the site mimicked the general slope of the country’s geography, signaling that the site itself was a mini-India while also conveying the scale of the station:

The country slopes generally from North to South and West to East, while the area on the Eastern boundary slopes from East to West. This natural slope of the country is of great help in constructing models cheaply and quickly since the models run from North to South and the supply channels for the models from West to East.\textsuperscript{25}

\begin{itemize}
\item \textsuperscript{23} Uppal, “Research for Bhakra,” 23.
\item \textsuperscript{24} Randhawa, \textit{A History of Agriculture in India. Volume 4. 1947-1981}, 94.
\item \textsuperscript{25} Uppal, \textit{Malakpur Hydraulic Research Station, India}, 5.
\end{itemize}
Uppal was a key figure in water resources work in Punjab. With a PhD and a DSc from the Punjab University, he was Director at the Land Reclamation Institute for thirty-five years and then Professor Emeritus at the Punjab Agricultural University, where he worked on the water resources models. (Figure 3.7) His primary research was in managing and reclaiming waterlogged and salinated soils, a problem that had dogged farmland in Punjab with the expansion of canal irrigation over the Indus plains. Between the Amritsar and Malikpur research stations, researchers were able to carry out projects for district governments across the country. While the Punjab government funded the laboratory, and owned the equipment, individual projects were commissioned by and paid for by clients who may have been states with their own irrigation projects.
The models and testing apparatuses allowed researchers to see parts of projects that would otherwise remain unseen. The visual nature of engineering knowledge-making and collection was key to the entire project of model making. For instance, the stations had a number of flumes that were used to calibrate instruments (Figure 3.8). These flumes were earthen, masonry, or glass. The glass flumes allowed researchers investigate “the movement of silt in suspended and saltation [along with] other visual observations.” Modeling allowed the possibility of looking at parts of the project that were not visible in any other way. For instance, in the experiment about using the diversion tunnel as a spillway at the Bhakra Dam, windows and pressure gauges were built into the curves for observation. These windows literally provided windows into the ways in which hydraulics worked in big dams.

Figure 3.8. Calibrating instruments on flumes at the Malikpur Hydraulic Research Station, from Malakpur Hydraulic Research Station, India.

26 Ibid., 10.
Although all the stories told about model making and experimentation at these facilities are geared towards solving problems as they emerged on site, the making of models themselves tells a different story. Uppal reported that complicated structures were “accurately moulded in Plexi glass in the workshop for the visual study of flow phenomenon. This is a highly specialised section which has evolved its own technique of work in this connection.” This case, in which the highly specialized section evolved an independent technique, speaks of scientific knowledge as developed in conjunction with the development of tools.

Modeling, as Andrew Pickering has pointed out, is an interactive process: it produces the object in the process of modeling that object. In recounting the history of the research station, the practice of modeling should be foregrounded over the models themselves. In model making, scale was perhaps the most important category of thought. One crucial task, which itself required experimental testing, was figuring out how to scale down a structure and maintain its efficacy in measurements. In the case of working models, each dimension was considered individually and scaled separately from the other dimensions. These included horizontal, vertical, lateral, discharge, time, and silt scales. When designing the models, the researchers would create temporary structures to determine the horizontal, vertical, and lateral scales. These rough models were easy to manipulate and change before the final ones were constructed. Once a model was constructed, the scale of the three physical dimensions was fixed. All experiments involved experimentally ascertaining the other attributes and then following up with experiments to solve any problems.
A Bird’s Eye View of Punjab’s Resources

India is blessed with bountiful natural resources of water, land and power. It has the highest mountain ranges in the world, mighty rivers, extensive glaciers, charming valleys, deep gorges, and vast fertile plains. The majesty of the great rivers of India has been described in the scriptures as well as the works of classical, medieval and modern India literature. Jawaharlal Nehru finds the history and glory of Indian civilization intertwined around these rivers. Such varied and extensive are the gifts of nature to India that it is difficult to visualise them from the study of a map or a book. A visit to a site may give only an idea of a particular place but not of the vast country surrounding it. A suitable method to have a comprehensive idea or a true perspective is to make a physiographic scale model of the whole area. Such a model of northwest India and the adjacent countries was undertaken in 1972-73 and completed in 1985-86. This model can also serve as a tool for the study and research in soil and water conservation, water management, and agrometeorology. An open air model of the water and land resources of Punjab and the adjacent states on a large scale was also built.28

This introduction to the publicity pamphlet for the Uppal Museum of Water, Land and Power Resources of Punjab encapsulated a desire to visualize and apprehend “India.” The building (Figure 3.9) featured a sign at its door that used the imperative verb form: “Discover India.” The project referenced Nehru’s Discovery of India. However, while Nehru’s discovery was recursive—you search for the country, but you find the polity—the Museum’s discovery was tied to an imagination of a unified political geography.

Randhawa commissioned the model from Uppal. In 1965, Randhawa visited the Malikpur Research Station and encountered their bird’s eye view model of water and soil conditions in the northwest. The Malikpur model was not a scientific testing model, but showed the extent of the state’s resources, both existing and proposed. It also represented areas of waterlogged soils and was used to map solutions. Randhawa thought that a similar model would be a good pedagogical tool in Ludhiana, at the Punjab Agricultural University (PAU). At PAU, model construction was begun in 1973 and only completed after seven years of intricate workmanship.\footnote{Ibid., 2.} This model was further expanded to range all the way from...
Pakistan in the west to China in the east, with all weirs, dams, and barrages marked on it (Figure 3.10).

![Figure 3.10. Prince Charles visiting the Uppal Museum, possibly on a visit to the Bhakra Dam. From the Uppal Museum’s publicity brochure.](image)

The utility of this model is debatable, but its presence is stunning. It required over nine hundred survey sheets from the government of India. The models were made by artisans, “workers in the art of model making,” and thus were necessarily assemblages of many different forms of expertise. These artisans included surveyors, technicians, draughtsmen, masons, beldars, and moulders.\(^{30}\) In representational models, as in the working models, each scale was treated individually. The horizontal scale was 1:100,000, while the vertical was a combination of 1:1,000 up to the elevation of 457m, and the remaining heights were 1:7500, which is to say vertical scale was exaggerated in relation to the horizontal by a factor of one hundred, and that the height of the tallest mountains were exaggerated even more.\(^{31}\) This

\(^{30}\) Ibid., 19.

\(^{31}\) Ibid., 3.
exaggeration can be seen in the way the mountains spring up from the plains in the image (Figure 3.11).

The physical features were plotted onto the ground to conform to the horizontal scale, and the various elevations were marked using thick wires. The artisans then used a material made of cement, sand, graded soil, mineral, clay, and additives that held its shape but was pliable enough to mold. The model was reinforced to bear its own weight and that of the people working on it. The structure was inlaid with copper pipes, each with a valve at the top of the water features to release water into them. It was also fitted with wires to light deep gorges and valleys. In addition to this, ten neon light tubes were molded into the valleys themselves, which can be seen in the image. The room was fitted with a trolley that could take the “traveler” thirteen meters across the model to look at spots that were otherwise inaccessible.\(^{32}\)

\(^{32}\) Ibid., 3–4.
Figure 3.11. The indoor model at the Uppal museum.
After the indoor model was complete, the team began working on the outdoor model, a stunning and huge structure (Figure 3.12). This model was designed to weather outdoor conditions. A profile was made in compacted earth, with steel reinforcement, over which bricks were laid. These were overlaid with concrete and then painted to mark the elevations. This was titled the “model of natural resources” because it depicted water sources far from where they were accessed via dams. In this model, as in the other, several different scales were used, but in a different way. For the elevations, the interior model exaggerated the taller ranges. In the outdoor models, the plains were constructed at a larger scale to show differences across distances. Peaks were scaled at 1:3,000 and plain at 1:400.

Even more remarkably, every tract of land was scaled differently. For example, the tract between the Ravi and Ghaggar rivers in Punjab were at the biggest scale, 1:5,000. For the tracts further away from Punjab, the scale was shifted to 1:10,000, and the places furthest away, such as the Kashmir Valley, were scaled at 1:30,000. The differential manipulation of scales in the model can be seen when it is compared to a map (Figure 3.13, 3.14, 3.15).33

33 Ibid., 11.
Figure 3.12. A satellite image of the physiographical model. The shorter side is around 30m. The library is to the south of the model.
Figure 3.13. A map marking the extent of the terrain represented in the Natural Resources Model. The blue pin in the center marks the Bhakra dam and the red pins mark the edges of the model.

Figure 3.14. A view of the model of natural resources.
Thus the bird’s eye view of Punjab’s water resources was a carefully constructed model. Bhakra, which technically is not even in the state of Punjab but across the border in Himachal Pradesh, was at the center of the model. The crafting of the model was a metaphor for the crafting of geography as a political terrain.

Multipurpose Materials and the Multiple Purposes of the Dam

Hydraulic engineers also used models to test designs prepared in the United States for the substitution of local materials: “the Research Institute is attempting to evolve specifications with the help of actual experiments whereby it will be possible to substitute kankar lime and other locally available material in place of the scarce cement for lining the Bhakra and Nangal canals.”

Cement’s waterproofing capacity made it too singular to waste on canal lining, while, as a multi-property plastic material capable of handling high stresses

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34 Our Own Correspondent, “Malikpur Hydraulic Research Station,” 8.
and strains, it was irreplaceable in the dam itself. Experimental models were seen as ways to negotiate these bottlenecks in the materials industry and localize projects for India. Models mediated between technology transfers and local material, forming a source of hybrid knowledge for the development project.

However, the Nangal Canal was not simply a problem of cement lining and waterproofing but of the multipurpose project. The canal was required to take on multiple functions that were not necessarily complementary and often contradicted each other. So experiments on the model had to determine whether to replace cement with a material that was waterproof or use cement in a way that exploited its waterproofing and structural properties.

These giant undertakings impose on the Amritsar Institute and the Malikpur Station vastly intricate tasks. For instance, the Nangal Power Canal has to be a different contrivance from any so far devised in this country. Since the turbines for generating electrical energy are to be run with its water, it cannot be closed even during the floods in the river, a novel feature. Therefore, measures have to be devised to keep the canal free from harmful sediments and boulders which will otherwise seriously jeopardies the life and service of the electric power system that will provide the entire East Punjab and Delhi with sufficient electricity to take care of all domestic needs and also the much needed industrial development. Important results obtained here are being communicated to Simla, from where the construction of the projects is being directed.  

This article, written in 1949, was untenably optimistic about the nature of a multipurpose project and about development itself as a multifaceted undertaking. Embedded in this paragraph is every ideal that was imaginatively ascribed to the Bhakra Dam. One of these was the capacity to produce copious amounts of power, which would then be circulated across East Punjab (now Punjab, Haryana, and Himachal Pradesh) and Delhi. This power would feed “domestic” needs, which is code for the aim to produce a modern liberal consuming class who

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would own appliances that needed power, like lights, fans, radios, and perhaps even televisions. Electricity would also serve developmental needs; that is, it would serve factories, machines, equipment, and so on, in and around urban areas.

Over the next few years, not only did it turn out that building a large consuming middle class was no easy task, but creating the grid connecting the Bhakra power plant to Delhi turned out to be an even more problematic prospect. The infrastructure required to move electricity over long distances proved too big of a project, one that raised the prices of hydel power and nullified the advantage of its cheapness. Delhi continued to sputter along on coal, and Bhakra produced vast amounts of power for no consumers. As a result, in 1955, the government chose to abandon the plan for the grid and absorb this cheap electricity with a fertilizer factory.\(^{36}\)

The site was chosen because the dam was producing more energy than could be consumed at that time, and fertilizer manufacture used a huge amount of energy. The Nangal unit of the Fertilizer Corporation of India was to absorb 150 MW of power to produce a nitrogenous fertilizer using electrolyzed hydrogen. This method came with a heavy water recovery plant which used the same process of electrolyzing water into hydrogen. Heavy water consists of water molecules whose hydrogen atom contains one extra neutron and proton in its nucleus, rendering it heavier. Heavy water occurs naturally, at a rate of one part heavy water in seven thousand parts water. Heavy water is added as a moderator in nuclear reactors because it can slow down neutrons without absorbing them; thus, it is a key part of fission reactions.

\(^{36}\) Raj, *Some Economic Aspects of the Bhakra Nangal Project; a Preliminary Analysis in Terms of Selected Investment Criteria*, 64.
This method of producing nitrogenous fertilizer, from air, using electrolyzed hydrogen, was extremely energy intensive. To some extent, it was only chosen to absorb the cheap energy produced by the Bhakra Dam and sold to the Fertilizer Corporation at the special rate of a few paise per unit by the Bhakra Beads Management board. The Nangal Fertilizer Factory contained one of the largest bank of electric cells and continued production until the 1980s, when pressure for power from the agriculture and industry grew too strong and it was not in the Bhakra management’s interest to commit so much electricity to fertilizer production. The inefficient and subsidized Nangal plant was no longer feasible and fell out of use.37

Naya Nangal (New Nangal) was a township built for the Nangal fertilizer factory. The plan for the plant and its accompanying township were designed and executed by Jugal Kishore Chowdhury and his firm, Chowdhury Gulzar Singh. Chowdhury’s firm was part of the developmental project through which the state managed food. Born in Assam in 1918, Jugal Kishore Chowdhury trained as an architect at the JJ School of Architecture, after which he trained in Town Planning at the University of London. He followed this with a degree in Regional Planning at the University of Tennessee. Chowdhury worked for the Tennessee State Planning Commission on the Tennessee Valley Authority (TVA) project before he returned to India in 1949.38

In India, Chowdhury began working on planning and design projects for the state. In 1950, he worked on the Kandla port. He then consulted on Chandigarh as the chief architect

38 Abdul Qaiyum, “Know Your Former Presidents, Padmashri J. K. Chowdhury,” Institute of Town Planners India Newsletter 8, no. 1 (January 2011): 11–12.
for the Punjab Government, before he worked for the Nangal Fertilizer corporation to design
the Nangal township. He also designed campus buildings for both the agricultural university
campuses in Ludhiana and Hissar, masterplanning the campus at Hissar along with Aditya
Prakash, and finally went on to work on other fertilizer townships. He argued that large
industrial projects needed to act as foci for regional development, which linked the profession
of physical planning with development planning. The idea that physical planning and design
were part of industrial growth was not completely obvious to those planning for development
and found many spokespersons in fields related to architecture. In fact, the history of modern
architecture has eschewed, to some extent, the commitment of architects to national planning,
and most of the work produced is hardly a part of the canon.

Bhakra Nangal and the Tennessee Valley Projects

The Bhakra Nangal Multipurpose Project had more in common with the Tennessee
Valley Authority (TVA) than simply an architect’s personal history. The TVA was a body
that oversaw a group of large industrial and energy projects on the Tennessee River, which
flowed largely through Tennessee, but also through the neighboring states of Georgia,
Alabama, Mississippi, and North Carolina. The Authority was conceived of in 1926, but given
a fillip by President Roosevelt in 1933, as the Great Depression started pulling apart the
socioeconomic fabric of rural life in the American South.

The projects under the jurisdiction of the Authority included dams, steel plants, and
later aluminum manufacturing, but the goal of the Authority was to provide integrated
resource management of fertilizers, agricultural commodities, and energy. In the process, this

39 Jugal Kishore Chowdhury, “The New Industrial Township Nangal,” Urban and Rural Planning Thought,
School of Architecture and Planning 1, no. 1 (January 1958): 27.
would provide other benefits, such as improving navigability, providing flood control, restoring marginal lands, and fostering agricultural and industrial development. Later, during World War II, the TVA was enlisted in the war effort, producing ammonium nitrate for weapons and aluminum for aircraft.

The TVA was a corporation clothed with the power of government but with the flexibility and initiative of a private enterprise. Arthur Morgan, its Chairman, called the program an “assemblage of political and economic expedients.” He took pains to explain Roosevelt’s philosophy of social inclusion, along with his vision of clarity, order, and integration. All this pointed to the problem of expending a large amount a capital when the benefits were not immediately visible. Morgan attempted to create legitimacy and public confidence through an appeal to expertise and long-range vision. He painted a picture painted of a relationship between the local dam and the growth of the country itself. The TVA was to bring sweeping change to the countryside, pulling it into modernity.

Although the TVA was steeped in an ideology of progress—of unified and coordinated protocols to efficiently bring jobs and resources to the American countryside—the task of legitimation was seen as external to the actual work of progress. Design and propaganda, in this account, made the TVA known to its people. The TVA was thus portrayed as a key purveyor of American greatness in the postwar period of reconstruction. This imagination became part of the technology transferred across borders to the emergent Third World. The TVA was the ideal embodiment of American liberalism and the New Deal.

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40 Morgan, “The Tennessee Valley Authority.”
41 Klingensmith, *One Valley and a Thousand*, 67.
India’s investment in large dams followed the TVA’s example. The Damodar Valley Corporation (DVC) was an extra-political authority that was built along the lines of the TVA. It was designed to oversee the region around the Damodar river, which fell across the states of Bihar (now Jharkhand) and West Bengal. William Voorduin, a civil engineer from the TVA, helped effect this technology transfer. Voorduin had six months to put together a plan for the Damodar Valley, but in many respects his more crucial task was to imbue a set of Indian engineers with the imagination of the TVA.42 As for legitimacy, the TVA was publicized in India as well through the United States’ Information Services’ Delhi publication, American Reporter, which explained how the project brought prosperity to an impoverished region.43

The Bhakra Nangal Multipurpose Project was not as embedded in the history of the TVA as was the DVC. However, there were important similarities between them. The major problem faced by the TVA was how to use the cheap power it produced: it produced so much power that it had to pay people to use it. The state paid for industry to move onto the electrical grid of the TVA and use the power. The Nangal Fertilizer Factory found itself in a similar situation: built to absorb surplus power.

Townships: Nangal, Bilaspur, Naya Nangal

Naya Nangal (New Nangal, 1958) was the third of three important architectural experiments to come directly out of the Bhakra Nangal project. The first two were Nangal township, built around 1948, and Bilaspur township, built in the 1950s. The three projects speak to the developmentalist drive towards reconstruction after partition and underscore the narrative of modernism as a strategy for dealing with scarcity. There is very little information

42 Ibid., 73–78.
43 “A Once Impoverished Region Achieves Prosperity, TVA is Boon to America,” American Reporter, May 10, 1967.
available on the first of these projects, Nangal Township. It was built between 1948 and 1952 as a residential site for ten thousand workers, officers, and engineers hired by the Bhakra project. The masterplan for the colony is sandwiched between the river and the road—a modified grid with two semicircular bumps that nestle into the curve of the river (Figure 3.16).

Figure 3.16. A painted map at the entrance of the township from the Nangal Dam.

The township’s red brick houses are iconic; the open spaces around which houses cluster are hierarchically arranged, moving from large to small. The detailing on the project is careful: for example, the horizontal window shade, the chajja, intersects with the vertical masonry structural members, and the metal work for the window grills mirrors the brick
lattice work at the staircase. The hierarchy of house types is clear; over the years the divide has widened as some properties have not been maintained (Figure 3.17).

The International Federation for Housing and Town Planning held their 1954 meeting in Delhi at the insistence of Nehru. The party of delegates made the pilgrimage up to the Bhakra, stopping at Nangal on the way. The proceedings recorded: “Later in the evening the party left for Nangal Township situated about 8 miles from Bakhra (sic) dam. The township which houses the project officers and workers is construction town and yet is very well equipped and provided for. After a rather anxious and strenuous journey the delegates were pleasantly surprised at the amenities which awaited them in Nangal Township.”

The description of the township mirrors other state-sponsored texts about the Bhakra dam in its conclusion that the town was surprisingly impressive. However, the project also speaks to the desire to create “model townships”—that is, perfect communities that were blind to caste stratifications and brought different classes together harmoniously (Figure 3.18).

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Figure 3.17. Back elevation facing street of the DSEE block. Notice the mirroring of the lattice work at the staircase on the left and the window grill. Photograph by author.

Figure 3.18. “General view of the Nangal Township. Built at a cost of Rs. 2 crores, the colony houses 15,000 workers. Residential Buildings, Schools, hospitals, dispensaries, post offices and recreation Centres have been provided in the Colony.” January 1956, Photo Division, Ministry of Information and Broadcasting, Government of India.
Bilaspur Township

The second modern township to come out of the Bhakra Nangal Project was the New Bilaspur Township. The older Bilaspur town, along with two hundred and fifty-six villages, drowned in the rising reservoir waters of the Gobind Sagar Lake and was replaced by a modern township. The Princely State of Bilaspur is just northeast of Punjab. It remained independent, under its Maharaja, until the independence of India, when it fell under the central government’s jurisdiction. The entire area of the Bhakra project fell within Bilaspur, which had been built on the left bank of the Sutlej. Bilaspur had little leverage and a lot to lose from the various shifts around independence; acceding to the central government was seen as a way to manage negotiations with Punjab about the dam’s construction. In 1954, Bilaspur was merged with Himachal Pradesh, though the state had sought its own stateship.

The new township was planned and constructed in 1958-59, two and a half miles upriver from the sunken town, by the Himachal Pradesh Public Works Department.45 The Bilaspur Gazetteer of 1975 includes two images, one of the old and one of the new town (Figures 3.18 and 3.19).46 The images are in stark contrast with each other: at the center of the image of the old town is the Shikhara of a temple. The houses are engulfed by trees, and the town spreads around the edge of the river. In the second image, one sector of the new town is a grid with wide-open roads and rectilinear brick houses neatly arranged inside their own plots. The old town had been the seat of the of the royal family and the region’s administration, and, as a result, the town was well maintained and the houses were well

45 Lok Sabha Press Release, November 29, 1957. Press Information Bureau, Government of India, File no. 580/29.11.57/12.05/12003
constructed, ventilated, large, and luxurious. However, they were not modern, and the new township brought sanitation and modern architecture. The new town, just a bit higher than the old one, had a view of the lake (Figure 3.19).

Figures 3.18 and 3.19. The old Bilaspur Township that is now submerged in the Bhakra reservoir and the new Bilaspur Township, built by the public works department. The image shows the modernist grid/sector model. Diara sector was built for the princely family. Images from the *Himachal Pradesh District Gazetteers.*, vol. 3, Gazetteer of India.
Naya Nangal

Naya Nangal Township triangulated Chowdhury’s professional concerns: the township acted as a point of growth near a major project, dealt with the planning of the township itself, and developed a unified architectural identity in detailing for the site. The project was deeply influenced by Le Corbusier. Coming to India from the US, Chowdhury acted as a transnational agent of architectural discourse, with an emphasis on the rationality of New Deal liberal infrastructure. He brought with him architecture’s concern to construct itself as a rational and universal science—one with cultural excrescences, but centered on a rigorous technical armature. As a result, the document reproduced in the School of Planning and Architecture’s (SPA) inaugural issue of Urban and Rural Planning Thought reads like a technical report of the conditions and program of the project. The essay was reproduced in Doxiadis’s Ekistics, a connection that helped establish modernist town planners as academics in India.47

The site was divided into two parts: the township to the north and the factory to the south. The river ran along the eastern side of the site, and the road between the factory and the town continued over the river and Nangal Dam towards Bhakra. The plan was haunted by the ghost of Le Corbusier, as a newspaper report recorded: “The Nangal township is attractively designed and bears the stamp of what has come to be known as the Chandigarh style.”48 At the heart of the township was the neighborhood unit. The town was divided into six sectors, each sector forming a neighborhood unit (Figure 3.20).

An important concern for the town was to manage growth. Chowdhury himself acknowledged this goal, as the dam was unlikely to have excess power to supply indefinitely. In this regard, obsolescence, not growth, should have been the aim of the plan, but the ideological pull of growth was perhaps too great to imagine another way of planning. Half of the factory site was left for industrial growth, while the city was divided into sectors and neighborhoods. The neighborhood design was in the lineage of the garden city (Figure 3.21).
The document Chowdhury produced laid out the conditions which the project addressed: the number of people that the site needed to house, the parameters by which it was to grow, and so on. A key part of the town was the set of housing types—Type 1, 2, 3, and 4—which were part of the way in which towns of this scale were usually designed. In Chowdhury’s document, perspective sketches of each of these housing types are shown. Through these housing types, architects took bureaucratic hierarchy and translated it into a plan. The designers were tightly constricted by government schedules, or lists of costs per square foot that architects and contractors were not allowed to exceed. These schedules mandated the hierarchy of houses in terms of the cost of construction at each level. These schedules of cost often remained outdated and led to plans that privileged the efficiency of construction over the design of the town itself.
The School of Planning and Architecture (SPA) was geared towards producing experts for physical planning. The editorial in this 1958 inaugural issue of Urban and Rural Planning Thought outlined the government’s mandate in forming this degree-granting technical school: “The main purpose of the School is to train students in physical planning; large numbers of such trained planners are needed at this stage of the country’s development.”\textsuperscript{49} As an architecture school, its curriculum was significantly different from that of the JJ School of Architecture (JJ) in Bombay and certainly a great distance from the Center

for Environment and Planning Technology (CEPT) in Ahmedabad, begun in 1962. While JJ, which produced a large percentage of India’s first wave of modernists, followed in the tradition of the colonial and to some extent Beaux Arts model of architectural training, CEPT turned towards the Bauhaus model architectural pedagogy. In contrast to both these pedagogical models, SPA, located in the capital, aligned itself with the production of experts for physical planning and development.

The first issue of Urban and Rural Planning Thought also contained an essay by Jane Drew on British New Towns, an essay by Joseph Allen Stein on neighborhood planning, and essays on planning in Delhi. Drew’s essay concerned fifteen towns constructed in Great Britain since 1946, following the New Towns Act, which were based on Ebenezer Howard’s Welwyn Garden City from the 1920s. Drew was evaluating these towns ten years in: “The real question is, are the new towns architecturally a success?” Her conclusion was that, “There is a general criticism of all these new towns … that they seem to be all general grown up toy-towns. They lack something. For all their unification, of like the care which has been taken in preserving the theories they lack a certain grandeur of conception and they lack, in spite of their so called modern design, a feeling of being pioneers, part of a really new world.” She argued that architects needed to produce a four-dimensional architecture, something that had only been demonstrated by cubist painters. The essay, more than a manifesto about the design of new towns, gave the school’s journal a platform from which to position itself.

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Stein’s essay on neighborhood planning came at the problem from the perspective of West Bengal’s new industrial steel town of Durgapur that he had been commissioned to design. Stein commented, “Yet it is apparent that in many ways, significant numbers of people are deeply conscious of ‘aesthetics’ as is shown by their instinctive awareness of how to select, wear, and drape the colourful textiles of India. One could continue the list,—ornaments, domestic rituals, alpona paintings, etc. and in fact, from ancient descriptions, it would appear that this aesthetic interest once extended to cities and buildings as well.” The line is telling in many ways: first, it implies that the aesthetic sensibility of Indians had been in question. Did it exist? Or had it been so deeply perverted by modernization, as Randhawa would argue, that it could not be recovered? Textiles were invoked, time and again, as a reminder that somewhere there continued to be an aesthetic sensibility.

However, when paired with Drew’s essay, Stein’s essay suggests that there was a greater crisis of creative imagination in town planning the world over, one that seemed to stem from reducing aesthetic questions to quantitative solutions. Maneklal Sankalchand Thacker, the minister of Scientific Research and Cultural Affairs, wrote the foreword to the journal’s first issue. His foreword outlined the knot of problems that the field confronted and brought together the various aesthetic and efficiency-related dilemmas that faced new towns.

The town planner today has not only to keep in view the proper use of available land, but also has to take into account environmental factors and socio economic considerations in preparing any development plan. Town planning has thus become the task of a group of experts working in coordination.51 Certainly, producing expertise was the task of the school, but the producing the opposite—an enlightened rural citizenry—was also of note: “Rural India will depend on rural citizens for its

51 Maneklal Thacker, Foreword Urban and Rural Planning Thought, School of Architecture and Planning 1, no. 1 (January 1958): Unpaginated.
future. It will be mostly a matter of public health engineering and personal hygiene in most cases. Only propaganda and education for improved living conditions can help to improve these areas.”

On the Developmental Model

Development bridged the distance between two simultaneous situations within the political geography of India. I began this section by arguing that Punjab was conceived of as plentiful amid scarcity. Political development was the act of distributing that wealth evenly across the state. But development also acknowledges that scarcity is a technical phantasm—an economic sleight of hand that can divorce a people from their potential. This was the key to Nehru’s democratic socialism and to his speeches. The Bhakra, then, was purely an instrument for bridging scarcity and abundance.

Ananya Vajpeyi notes that “Nehruvian” and “Gandhian” tend to be considered conflicted antonyms reproduced in multiple registers: modernity and tradition, present and past, West and East, and so on. She instead proposes that the Nehru-Gandhi binary be considered an internal struggle against the contradictions of political and social life in India. For instance, Nehru’s desire to harness the Himalayas, an expressly Nehruvian developmental desire, conflicted with his other desire for political reform in villages, which was a Gandhian aspiration rewritten in terms of the state. These contradictions are starkly evident in Nehru’s writing, and I contend that he grapples with these problems in his speeches.

Nehru returned to the same ideas, although each repetition was a slightly different iteration of the previous version. He repeats himself having learnt in between. “Waste” is one

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53 Vajpeyi, Righteous Republic, 206.
of his often-repeated tropes and perhaps the most significant of Nehru’s rhetorical bridges between abundance and scarcity: we are wasting our abundance as we are ravaged by scarcity. “Waste” became a shorthand signifier of the possibility of achieving abundance from scarcity through a planned and efficient process.

In the USIS published book, *A Common Faith*, there is an image of a waterfall (Figure 3.23), with text beneath it attributed to “a patriot,” who recollects how, “Decades ago, when the great engineer-statesman of Mysore, Dr. M. Visvesvaraya, visited the magnificent Jog falls on the Sharavathy river, he had only three words to say, ‘What a waste!’”

![Figure 3.23. Jog Falls, Karnataka, image I. D. Beri, Text, unattributed. USIS, A Common Faith, 40 Years of Indo US Cooperation 1947-1987, 46.](image-url)
The lesson here for our current twenty-first-century predicament is complicated, in that we live in an inverse world: we are abundant in the midst of scarcity. We are awash in fossil fuels and commodities, but our abundant enjoyment of them obscures their real scarcity. Here again we see the perverse playing out of the classical marketplace, where scarcity does not indicate dearth, but rather the market’s capacity to price an object. It is the inverse of the early years of independence, where the problem was that of the diabetic: we are starving in the midst of surfeit. Now we have the problem of the obese: we are overweight in the midst of nutritional scarcity.

For Nehru, the dam was a place of respite from politics. At independence, the Congress Party was an umbrella party—that is, a party that brought together a broad range of viewpoints united politically in order to end British rule. Although one of Nehru’s goals was to break the stubborn nexus between wealth and power, state politics was dominated by resistant, elite landed classes, who were not necessarily interested in social reform. Thus Nehru talked about the dam as a place that he went when he was overwhelmed with Delhi, to make his heart happy, to give himself courage, and to remind himself of what is possible when people cooperate and work together. Its construction signified the nation state itself coming into being. However, this process of coming into being was akin to the always deferred, metapolitical promise of the state: what the state promises one moment, it fails to deliver the next.

I argue that the dam was an overdetermined psychoanalytical object: in Ashis Nandy’s terms, it was a transitional object that helped the nation state cope with the traumatic wound of partition. But the dam was also an attempt to recover that which was lost to

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54 These were sentiments he expressed at the opening of the dam.
colonialism. The obsessive pursuit of the excess of the dam was charged with the idea of the recovery of some unfathomable loss, a Lacanian structural loss. The one inescapable quality of Nehru’s speeches and texts is the pleasure with which he speaks of the dam. In Nehru’s language, the dam provided the possibility of achieving a satisfaction without the accompanying loss that was inscribed into the very birth of the nation state.

The planning commission, thus, was necessarily an extra political organization, with the Prime Minister at its head, whose structure was an attempt to circumvent the entrenched interests of the landed elite who controlled the state governments. Dam-building projects pushed against these state governments because, although irrigation was a state issue, power fell under the central government’s jurisdiction and river projects crossed state lines. The technocratic nature of the developmental project, as Partha Chatterjee points out, rendered it fundamentally apolitical, a move that allowed developmental economics to see itself as a rational agent of progress thwarted by politics. In this context, concrete emerged as a material crucial to the rational state.

Another iteration of this technocratic logic was the binary construction of modernity and tradition. Tradition emerged as a category within which everything that could not be consumed by the hunger of progress fit. It was a category of things that did not participate in the rapacious thrust of modernity. Architecture tended to fall into the second category of tradition. Achyut Kanvinde, one of India’s earliest modernists, discussed how his more stark designs were received: he was asked to incorporate something Indian in them. Tradition became window dressing on modernity’s ugliness. Consider Nehru’s request to Le Corbusier

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55 Conversation with Sanjay Kanvinde, 2014
to beautify the Bhakra dam. The role of the architect was that of cultural creativity used to mitigate the harsh reality of modernity forged in the crucibles of scarcity and progress.

It is no wonder, then, that out of this same crucible came the fraught conception of identity: what constitutes Indianness? What should the aesthetic of this new state be? Geeta Kapur argues that aesthetic tradition, when interpreted by the state, became “cultural creativity,” which was then subsumed into a set of institutions and assigned the task of yoking modernization to culture and thus legitimizing the developmental state.\(^{56}\) The identity problem emerged as a technology for manufacturing the imagined community of India, an apparatus that eventually could not be dismantled once the task of producing the sovereign state was complete. The quantitative field of planning and the pursuit of tradition were cleaved in the crucible of state formation. In this process, the state’s technocratic products themselves were rendered models of modernity and were compelled to produce a language of progress with which to speak to the world.

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\(^{56}\) Kapur uses Satyajit Ray’s *Apu* trilogy to make this argument. She argues that the state’s endorsement of the film fell into the category of its interest in promoting “cultural creativity,” something that it hoped would legitimize its developmental drive. Geeta Kapur, “Cultural Creativity in the First Decade: The Example of Satyajit Ray,” *Journal of Arts and Ideas* 4 (1993): 20.
Chapter Four

Growing a Campus to Design Seed

The Polysemic Campus

Kundika (sprinkler): This vessel of sacred water used for transformation by Maha Mayari, (Buddhist Goddess of Learning), symbolizes knowledge and tools for equipping human kinds to meet the challenges of modern life. Its tripod support represents the campus environment where education can perform such a transition.

- Achyut Kanvinde and H. James Miller, November 1969

Consider the cover of Achyut Kanvinde’s and H. James Miller’s book, Campus Design in India, Experience of a Developing Nation (Figure 4.1).\(^1\) The image features a shallow bas relief sculpture that depicts a small tripod under the *maha-pari-nirvana* from cave number twenty-six of the Ajanta Monastery cave complex, which was built between the

\(^1\) Achyut Kanvinde, an architect, and James Miller, an engineer from Kansas State University, together wrote and published a manual on campus design in 1969, looking at the challenges faced by the design process in developing India. The manual acts in part as a critique of the Public-Works-Department model of construction, where buildings were reduced to vessels that had no bearing on the nature of education, and in part as a tribute to the long history and possibility afforded by the state’s project for transforming itself, unburdening itself from backwardness, through a modern knowledge economy. However, the narrative of scarcity that rendered all ornament as criminal waste and all material as instrumental also rendered this book a manual and instrument of information, rather than a book about campus design. Achyut Kanvinde and H. James Miller, *Campus Design in India: Experience of a Developing Nation* (Topeka, Kan, Printed by Jostens/American Yearbook Co, 1969).
Second Century BC and the Twelfth Century AD (Figure 4.2). Suspended from the tripod is a leather water bag, the *kundika* or sprinkler. Miller and Kanvinde wrote that while the water allegorizes knowledge and its distribution (sprinkling), it was the tripod that held their architectural interest: the tripod represents the campus environment that can transform and enlighten India’s citizenry, initiating them into a new and scientific modernity. Equating the Buddhist and European enlightenments, the authors suggested that modernity needed a site, an environment, a campus, a room, in which it could grow and thrive. For the architects, the university provided the urgent scaffold on which the body, the commodity, and the landscape could be transformed from their colonial and premodern conditions into their modern versions, whatever those might be.

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3. The role of Buddhism as an origin point in the narrative of modernist Indian nationalist narratives is underscored in the singular sentence linking Buddhist knowledge and the challenges of modern life. The book delivers on this idea in its case studies which begin at the “campus” of the Ajanta Caves and leap forward to the 1950s. See Kanvinde and Miller, *Campus Design in India*. 83. This narrative also played out in art historical arguments in the work of Ananda Kentish Coomaraswamy. For more on the national claim on Buddhist art, see Tapati Guha-Thakurta, *Monuments, Objects, Histories: Institutions of Art in Colonial and Post-Colonial India* (Columbia University Press, 2004), 187.
Figure 4.1. Cover of Achyut Kanvinde and H. James Miller’s book, *Campus Design in India, Experience of a Developing Nation*, showing the bas relief sculpture from the Ajanta Caves.

Figure 4.2. *Kundika* below the *maha-pari-nirvana*, Cave 26. Interior. Sculpture: Nirvana of Buddha, Ajanta Caves, Ajanta, Maharashtra, India, Image from the Harvard Library Collections.
Why did the design of universities acquire such urgency at this juncture? The university formed a third and essential vertex in the developmental triangle in Punjab, along with the capital project of Chandigarh as the new administrative site and the Bhakra Nangal multipurpose river management project as the new showcase for engineering expertise. Nehru referred to both Bhakra and Chandigarh as “schools” in which the nation would learn modernity and produce a skilled labor force and a professional class of managers and administrators. Yet there was no gigantic project that could act as a “school” to teach farmers how to increase production and become the bread-basket of the nation. Thus, a third school was in order, an institution that could be the site of “the scientific new,” an agricultural institution that would produce both the personnel and the commodities that could seed the transformation of the country. As a result, both campus and curriculum became an apparatus with which to remake the body of the kisan (farmer).

Architects, foreign experts, and Indian administrators imagined the campus as a site for three distinct aesthetic ideas respectively: for evolving a language of modernism distinct from that of Le Corbusier, for transferring American biotechnological ideas and using them to represent “progress” in the Indian agricultural field, and finally, for the aesthetic remaking of the rural landscape and the transformation of the farmer into a modern “agriculturalist.” As a result, the university emerged as a polysemic site—a contested terrain caught between the various politics of those invested in it. The form and shape of the campus can thus be read as a palimpsest of competing imaginations of modernity.

This chapter examines the Punjab Agricultural University (PAU) between its establishment in 1961 and the end of the term of the second vice chancellor in 1976 as a case in point. During this time two important figures—architect Aditya Prakash and landscaper-
bureaucrat Mohinder Singh Randhawa—engaged the campus in innovative and radical ways. As a result, PAU’s campus is unique in the country. I argue that the campus provided a space for experimentation in new architectural forms that were constrained by material scarcity but aspired to the nation-building project. Architectural experiments on the campus by architects such as Aditya Prakash, Joseph Allen Stein, and Manmohan Sharma constitute an early critique of Le Corbusier’s reductive climatic modernism. Here, Le Corbusier’s much celebrated *brise soleil* begins to die and his machismo, best represented in his adulation of the bull as a symbol of Indian power, is replaced by a different imagination of the laboring body. The masculine force of the bull begins to turn towards the feminine reproductive labor of the cow. The campus is indubitably shaped by its urban context. Its architect, Aditya Prakash, was so affected by the failures of industrial modernization as they came to constitute the city of Ludhiana that he dedicated his architectural career to protecting Le Corbusier’s city of Chandigarh—not through a model of heritage conservation, but rather by developing robust systems to prevent its demise. In this chapter, I argue that as scarcity morphed from an economic condition in the 1950s into a political and ideological force in the 1960s, it shaped the goals and aims of both the campus and curriculum of the university, which became an apparatus with which to rethink the figure of the laboring body and remake the body of the *kisan* (farmer).

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4 Today, Chandigarh’s Capitol Complex, where the buildings were designed by Le Corbusier, has become a heritage site. HT Correspondent, “Chandigarh’s Capitol Complex Is Now a UNESCO Heritage Site: All You Need to Know,” *Hindustan Times*, July 18, 2016, http://www.hindustantimes.com/punjab/chandigarh-s-capitol-complex-is-now-a-unesco-heritage-site-all-you-need-to-know/story-B3hHy2vXiepSGyM5uXVOYJ.html.
Development in Crises

The university was shaped by the various economic and political crises facing India in 1959, at the end of the second Five Year Plan; this chapter investigates campus and curriculum design strategies enacted on both of PAU’s campuses in the cities of Ludhiana and Hissar as methods of managing these crises. These strategies helped pivot the agrarian sector into what would come to be called the Green Revolution. As I have mentioned, the campus was imagined as a site for three distinct things: architects saw it as a way of remaking modernity outside of the Corbusian mold; foreign experts saw it as a way to transfer American biotechnological “progress” to the Indian agricultural field; and, finally, Indian administrators saw it as a site for the aesthetic remaking of the rural kisan into a modern “agriculturalist.” Simultaneously, the university emerged as a contested site, caught between the politics of governments at the state level and the central level as well as between the agriculturalist and the kisan. Design of the buildings and of the curriculum were sites for transformation—primarily remaking the body of the farmer.

In 1959, towards the end of the planning period, several failures of the second Five Year Plan eroded political support for the Nehruvian central government; this weakened the will for agricultural reform, which was already resisted by the landed agricultural classes who held power at the level of the state governments. This political crisis was further aggravated by the failure of rains and the consequent dismal production of foodgrains, while population growth refused to stay within the bounds projected by the planners. The third Five Year Plan faced these insurmountable obstacles and, as a result, it was a document without a clear aim that tried to address too many competing interests. The plan was neither able to provide political support for its agrarian land-reform agenda, nor stake out its position for political
reform in the countryside. One of the lasting institutions that gained traction in this plan was the rural *panchayati raj*. In creating a hierarchy descending from the Zilla Parishad to the Gram Panchayat, the central government attempted to develop a conduit of influence between the central government and the farmer, one that could ideally undercut the *zamindari* (landed classes) networks that persisted in the state governments, in spite of legislation against the institution of *zamindari* itself.

Simultaneously, during the Cold War the US emerged as “far more than an interested observer,” particularly in agricultural matters, since food shortages are a traditional theater of political disillusionment. Liberal American political theorists, particularly John P. Lewis of the Brookings Institute, claimed that India was poised at a juncture, with the 1960s as a decisive decade that could either lead to the collapse of this optimistic democratic project or launch it into the Rostovian “take-off” stage. In 1962, after spending twelve months in the country in 1959 and 1960, Lewis published his book, *A Quiet Crisis in India* (1964), where the subtext of this juncture was the communism/capitalism alternative.5 As an economic proxy of the Cold War, India’s developing scarcities made the US wary. Lewis, like most, struggled to characterize India’s economy, labeling it a “distinctive” form of growth, yet he also put forth a more traditional proposal that mapped out a possible path to a Rostovian “take-off” stage. This involved a turn away from the possible red revolution to a green one.

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6 Rostow’s influential five stages of growth described the five stages of transition from a precapitalist economy to a high capitalist one. The stages were traditional society, preconditions for take-off, take-off, drive to maturity, and the age of high mass consumption. The first of the five stages stood in a different category from the rest. The next four had a sequence to them, and in keeping with the ideal liberal marketplace, they followed each other without the intervention of the state. The difficulty lay in getting an economy to the point of the preconditions of take-off. This problem dogged Indian intellectual thought, even when the desire was not for a purely liberal marketplace. In 1960 in a lecture on “Crossing the Barrier of Poverty,” Nehru said, “The blind forces of the market are always widening the gap, whether they operate
The term Green Revolution itself was a linguistic offensive against politics. The term coined in 1968 by William Gaud, director of the US Agency of International Development, who said, “These and other developments in the field of agriculture contain the makings of a new revolution. It is not a violent Red Revolution like that of the Soviets, nor is it a White Revolution like that of the Shah of Iran. I call it the Green Revolution.” Developing agricultural campuses through the institutional network of USAID and the Rockefeller Foundation became a key strategy in shifting India’s distinctive pattern of growth towards a purported US model.

In this cautious political climate, scarcity—a fundamentally economic problem which was addressed in the first and second Five Year Plans—was being recast in political terms: what is a politics of scarcity? Lewis himself advanced the idea that scarcity was not a collective lack of resources; in his opinion, it was instead the failure of the individual to understand the flexibility of his or her own abundant labor. He argued, for instance, that Indians were not materially minded enough to value immediate tangible gains, and so rather than a scarcity of resources, there was a “scarcity of discontent with the economic status

nationally, internationally, or regionally. This deeply concerns us. We are struggling to get out of the morass of poverty and to reach the stage of what is called ‘the take-off’ into sustained economic growth.” Here Nehru's frustration seemed to be with not only the poverty, but also the language. Not only how do we get to the “take-off” point in the Rostovian model of growth, but more importantly, how do we get beyond this language? In the language of development, we will never get beyond certain points.

8 Only in 1981 will Amartya Sen theorize scarcity as the incapacity to exchange one’s labor for wages commensurate to inflated food prices.
9 Lewis says, “I am inclined myself to suspect (unscientifically) that even in transformed, modernized India the appetite may never become, on average, quite the consuming passion that it is in the United State or parts of Western Europe or Japan, or that it may turn out to be in China.” So this then is the old problem of casting the Indian as spiritual rather than material. Lewis, Quiet Crisis in India; Economic Development and American Policy, 30.
Lewis’s postulation shifts scarcity from its economic home into a political dimension. Indians did not experience the psychoanalytical lack that drove capitalist growth: they fell outside of the normative framework of desire.

Another iteration of this idea comes from Myron Weiner, who wrote “The Politics of Scarcity” (1962). Scarcity had, in India, become so obvious, that Weiner found no need to explain what scarcity was. Rather, in his work, scarcity—a word which barely appears in the book outside of the title—stood in for “India” as its synecdochic representation. Weiner, writing at the same time as Lewis, argued the exact opposite. For Weiner, scarcity had caused serious and severe discontent and a politics of “indiscipline” (Weiner’s scare quotes) had disrupted what was supposed to have been a smooth path into modernization. Thus while Lewis’s scarcity of dissatisfaction held Indian labor back, Weiner’s dissatisfaction from scarcity fomented a volatile political disillusionment. Thus, in the 1960s, scarcity turned into an ideological condition, one that created its own regime of representation—an aesthetic language that circumscribed political conditions.

Agricultural Education Policy

A shift occurred in 1959, in the third Five Year Plan: agricultural education was wholly transferred from the Agriculture section to that on Scientific and Technological

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10 Lewis continues, “But this is by no means to say that India is a culture where the scarcity of discontent with the economic status quo is so great as to place an effective restraint on the development process.” Although Lewis seems to be stating the quote as a counterargument, it sums up his position on the subject, while underscoring the American paranoia about revolution. Ibid., 31.
11 Lewis goes through the four “critical scarcities that he sees affecting India: The scarcity of a will to work, the scarcity of domestic savings, the scarcity of decision making capacity, and the scarcity of foreign exchange.” The fourth, he argues is critical and the only response is to slow down growth. Ibid, 31.
12 This argumentation bears a striking parallel to the economic argument that Indian farmers are “price unresponsive.” No matter how much prices rise / fall, Indian farmers do not change their productive output. Therefore, demand side market forces do not have their normative effect on the agricultural sector. Varshney, Ashutosh. Democracy, Development, and the Countryside: Urban-Rural Struggles in India. Cambridge England; New York, NY, USA: Cambridge University Press, 1998. 36
This new framing of agricultural research within science and technology came from the Rockefeller Foundation, then working out of the famous Ashoka Hotel in New Delhi. The Rockefeller foundation entered India only after much debate among its trustees and president, in the 1940s and early 1950s, as to what role the foundation might play and how efficacious it might be in sending resources to the new democracy. Not until 1954 did Ralph W. Cummings, who later became the director of the Delhi office, begin the process of bringing the lessons of agricultural research from Mexico to India. In 1960, invited by the Indian Council of Agricultural Research (ICAR, previously the Imperial Council of Agricultural Research), Cummings chaired a committee to create a proposal for agricultural universities. The committee, which included Ephriam Hixson, Agricultural Education Advisor with USAID, K. C. Naik, representing ICAR, and L. Sahai, Commissioner of Animal Husbandry, published their report in 1960. They developed it through visits to various states to study how education was integrated into extension work. Although the report itself was published after the third Five Year Plan was written, the effects of the committee, such as the shift from agriculture to scientific and technological education, can be seen in the plan.

The major thrust of the report was integration. That is, how could these institutions bring research, teaching, training, and extension together into the ambit of one institution,

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14 The Ashoka Hotel (1955) in New Delhi was designed by E. B. Doctor, a Mumbai based architect. Lang argues that the modernist plan of the building was decorated with traditional forms in an effort to ground it in its context. Jon Lang, A Concise History of Modern Architecture in India (Ranikhet: Permanent Black, 2010), 42.

15 Dr. Gregg to Board of Trustees, August 14, 1952, Folder 1, Box 1, Series 460, Rockefeller Foundation records, projects, RG 1.2, Rockefeller Archive Center, New York.
where the flow of information from “lab to land,” as it would later come to be called, could be transmitted most efficiently? The proposal, its writers stated, originated from the suggestion of the 1948 University Commission headed by Dr. Sarvepalli Radhakrishnan (whose birthday India incidentally observes as teacher’s day), which laid the foundation for state-sponsored higher education programs in India. The 1948 report treated agricultural education as one small piece of a larger humanities education program culminating in the “rural university,” which the new committee reported that it imagined as a “ring of small, resident, undergraduate colleges with specialized and university facilities in the center.”

The new committee performed a disingenuous double move, simultaneously linking their proposal to Radhakrishnan’s report while reversing his imagination of the rural university completely. In sum, although the University Education Commission’s report was continually cited as the inspiration, there was hardly any similarity between its imagination of a widely available liberal education and the technological agricultural model proposed by American experts.

Radhakrishnan’s decentralized Gandhian mode of organizing people and resources into a networked set of learning centers in the rural countryside was proposed as an attempt to balance higher education’s urban bias. The report aimed to create a humanistic curriculum: “the great cultural values are not peculiarly rural or urban, but are common to all humanity. As described in this report under General Education, a common core of liberal education may be assumed for the rural university as for any other, though the methods used in teaching and in learning may be different.”

This imagination of a rural university was in stark contrast to what was proposed by the Indians and Americans on the committee in 1961. Rather, the

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16 Indian Council of Agricultural Research Report, c.1960, Folder 623 Box 95 Series 1.5 Rockefeller Foundation records, Field Offices, New Delhi 6.7 Rockefeller Archive Center, New York.
committee proposed that the features in agricultural education should be “new and distinct from those existing in present institutions.” They quoted Nehru to mark this ideological difference: “Educationally it registers a shift from what the Prime Minister of India described explicitly during the recent inauguration of the U. P. Agricultural University at Rudrapur as, ‘the training of Babus to the training of Kisans.’” The education ministry itself decreed that these schools no longer be called rural and instead be called agricultural, shifting the emphasis from its rural focus to a sometimes urban and always technological concept of agriculture. It was mandated that universities change the way in which agricultural research was conducted and the way in which educators, scientists, and farmers interacted.

The new committee’s report was published in 1962, and from it were born the twin campuses of the Punjab Agricultural University (PAU) in Ludhiana and Hissar. In this third planning period, the government was responding to an increasingly watchful and interested America, a rising condition of scarcity, and the attrition of land reform. The campus acted as a microcosm for the state’s agriculture sector, both as a model for how it was expected to grow and also as a site for local politics, particularly when the state was further divided into three linguistic pieces. The intersection of these politics with technomodernity and bureaucracy make the project a vivid study in how modernism saw its role in the global South and how it responded to conditions on ground. In what follows I read a variety of narratives as they came to be articulated in the modernist confines of the campus: narratives of a transforming subjectivity, of development and planning, of linguistic division, of technomodern agriculture,

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19 Kathleen Prop writes that the Ministry of Education required the name change so as to prevent confusion between rural universities and rural institutes. See Kathleen M. Prop, The Establishment of Agricultural Universities in India: A Case Study of the Role of USAID-U.S. University Technical Assistance (Urbana-Champaign: University of Illinois, 1968), 12.
of the utopian project of the Third World, of the global North’s interest in the global South, and of the aesthetic reconfiguration of agriculture.

In 1961, the third Five Year Plan came into effect. It stated that:

the responsibility of the agricultural university extends beyond teaching to applied as well as fundamental research in agriculture and involves special obligations towards cultivators in the area served by the university, in particular, to discuss their problems by working with them, transmit the results of research, and bring teaching, research and extension into an integrated view of agriculture and agricultural education.\textsuperscript{20}

The government of Punjab, headed by Pratap Singh Kairon, immediately began to acquire land in both Ludhiana and Hisar for the two campuses of the university. On October 18 of the same year, \textit{The Punjab Agricultural University Act, 1961}, was passed; it put in place the administrative and logistical structures of the institution. The act was forged out of the work of the Indo-American joint committee, who published a specific report for the PAU which reiterated their major points of contention with the current education system: that it consisted of largely unorganized and incoherent institutions, which would work better if they were administratively connected to each other and to the smaller sites on ground. Rather than Radhakrishan’s ring of schools in villages, the new report proposed two major campuses, both in cities, connected to extension sites in the countryside. This new structure centralized resources without undoing the autonomy of educators. Universities were to give faculty the freedom to design studies while maintaining control of shared resources.

Kairon’s government invited Prem Nath Thapar to be the Vice Chancellor of the University. Thapar, better known for his role in inviting Le Corbusier to India after the death of Chandigarh’s prior architect, Matthew Nowicki, took control of the project and began

\textsuperscript{20} India Planning Commission, \textit{Third Five Year Plan} (Manager of Publications, 1961), 322.
recruiting administrators and experts to Ludhiana to design and run the university. One of these invitations went to the young Aditya Prakash, and soon after the official 1962 inauguration, the young architect moved his family to Ludhiana to begin his first major commission after working under Pierre Jeanneret in Chandigarh. During his tenure he lived on campus. Here, he worked on master plans for both the Ludhiana and Hisar campuses and also designed three buildings. In 1966, four years later, Prakash moved back to Chandigarh to assume the role of principal of the Chandigarh College of Architecture. This time spent in Ludhiana was formative to the young Corbusian-minded architect and his experience of the unplanned city, of the non-tropical climate, and of the nature of the profession deeply influenced his work in Chandigarh as urbanist, artist, and activist.

Aditya Prakash: Folding away from Ludhiana’s Chaos

Prakash brought with him the euphoria of having successfully completed the massive project of Chandigarh. He was, however, enthusiastic to test new ideas about design, planning, and construction in his own projects. But on moving to Ludhiana for his job as chief architect of the Punjab Agricultural University, he discovered that the new Vice Chancellor, Prem Nath Thapar, wanted to immediately begin construction. Much to his dismay, Prakash discovered that Thapar had sought him as an architect who could replicate Le Corbusier’s architecture quickly, by transplanting plans from Chandigarh, and thus efficiently incorporate

21 New York planner Albert Meyer and South-Carolina-trained Polish architect Matthew Nowicki were hired to draw up plans and designs for Chandigarh, the new capital city of the state of Punjab. Nowicki’s death in 1950, in an airplane crash, left the project without an architect. Thapar traveled to London in search of a new architect for the project, where he met with Maxwell Fry and Jane Drew. The British architects encouraged Thapar to visit Le Corbusier in Paris, where Le Corbusier sent the bureaucrat on a train to Marseille to visit the Unite de Habitation. In what followed, Le Corbusier was hired to work on the designs for Chandigarh, and eventually, Meyer quit the project. Vikramaditya Prakash, Chandigarh’s Le Corbusier: The Struggle for Modernity in Postcolonial India (Seattle: University of Washington Press, 2002), 42–43.
modernity into the agricultural project.\textsuperscript{22} Thapar invited Prakash to perform this transplantation and replication, but the young architect, brimming with enthusiasm for design, had “researched and evolved some ideas of [his] own in architecture and was anxious to give vent.” Thapar’s impatience recalls the ideological specter of scarcity: here time was a resource wasted in redesigning and reinventing what had already been expertly executed in Chandigarh. Eventually the matter was resolved by routing Prakash’s designs through Jeanneret, whose word had more authority than that of the younger architect.\textsuperscript{23}

Prakash used Thapar’s acquiescence to tour and study several agricultural universities and colleges in the country. He doesn’t recount the universities he visited, but one might hazard to guess that he visited the Tarai State Farm of the Uttar Pradesh Agricultural University in Pantnagar, now in Uttarakhand. Prakash’s sentiment from this tour was disappointment, the architecture was “poor [and has] scarcely any zeal or drive.”\textsuperscript{24} Pantnagar was the first of the new type of agricultural institutions coming out of the second Five Year Plan. It was a pilot project that would define the institutional relationship between India and the US as well as between the central government and the individual states. The campus and project is deserving of an entire chapter or dissertation of its own; though it is outside the scope of this chapter, a few important points must be highlighted. The site of the farm contrasted with the urban location of the PAU, yet it was not in the “countryside.” Rather, it was constructed in the dense forests of northern Uttar Pradesh and was not “rural” in the sense

\textsuperscript{22} Nowhere does Prakash mention colleague and architect Manmohan Sharma, who is also credited with working on the masterplans and certain architectural projects on the campus. Sharma, who also worked with Jeanneret on Chandigarh, was appointed chief architect of the state of Punjab in 1962, and was perhaps associated with the project through this institutional route. In this chapter, I only discuss Prakash, although Sharma was certainly part of the project.

\textsuperscript{23} Aditya Prakash, “Punjab Agricultural University, Ludhiana, Some Thoughts: Some Memories,” \textit{Advance, the Punjab Magazine}, June 1988, 13.

\textsuperscript{24} Ibid.
that the educator Sarvapelli Radhakrishnan had meant in 1948. The project pioneered a model for how the American Universities could insert themselves into Indian agriculture. The blueprint for Pantnagar was drawn up with the help of experts from the University of Illinois.

Pantnagar was built largely with aid from the US’s Technical Cooperation Mission and expertise from University of Illinois. Eisenhower visited the site when he visited India to inaugurate the Amriki Mela (American Fair) at the country’s first World Agriculture Exhibition in 1959. Kanvinde and Miller described the campus as having been “handicapped, instead of assisted, by the mediocre campus environment created by the [Public Works Department].” They eviscerated the planning and architecture of the project, decrying the carelessness with which the Public Works Department had deforested the site only to insert an arbitrary radial plan, thus sacrificing programmatic juxtaposition for classical geometry (Figure 4.3).25 While the two architects are correct about the failure of the plan, embedded in their excoriation was a critique of the colonial classical imagination inherent in the Public Works Department’s plan. Through their criticism, Kanvinde and Miller were valorizing modernism’s rationality, which they saw as coterminous with that of the developmental state. This rationality was to opposed the flagrancy of colonial geometry, which was a metaphor for an extractive imperial economy.

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25 They argued that the scale of the plan betrayed a “lack of professional competence regarding human scale and distance, spatial form and proportion, use of materials, and functional relationships.” Kanvinde and Miller, Campus Design in India; Experience of a Developing Nation, 115.
Prakash’s masterplan for the Punjab Agricultural University (Figure 4.4), haunted by the ghost of Le Corbusier, was divided into four sectors. Each sector contained one of the four central activities: academic buildings, staff living, student living, and administration. Here the rationality of the program determined the geometry of the plan. A large piece of the land was dedicated to experimental farmlands, and the commission for each building was given to a different architect. Manmohan Sharma, who worked with Prakash in the early years of campus planning, designed the administrative block, while the commission to design the college of Home Science was given to Joseph Allen Stein (Figure 4.5). Prakash first designed the boys’ hostel and, later, the College of Agricultural Engineering. The campus is full of forgotten buildings and projects, hardly any of which appear in canonical histories of architectural modernism. Somehow this set of projects falls into the gap between the triumph
of Le Corbusier in Chandigarh and the escape from its gravitational pull that was only achieved outside of Punjab, in Ahmedabad and Delhi in the 1970s and 80s. These few experiments in modernism, including Stein’s Home Science building, are hardly mentioned, even in biographies of these architects. What was the point of failure that caused this architecture to vanish from the collective memory of the profession?

Figure 4.4. Aditya Prakash’s design for the Punjab Agricultural University. Plan from Campus Design in India; Experience of a Developing Nation. 118.
The Boys’ Hostel

Two buildings on the campus stand out in the œuvre of Prakash’s work: the Boys’ Hostel and the College of Agricultural Engineering. Both buildings mark Prakash’s simultaneous adulation and critique of Le Corbusier’s modernism. They represent Prakash’s desire to extrapolate what he saw as the best of modernism, but reimagined for a more considered understanding of climate and space and for the onslaught of developmental modernization.

Prakash studied at the Delhi Polytechnic—now the School of Planning and Architecture (SPA). When its British faculty moved back to England, he too moved with them to finish his degree at the London Polytechnic. After this, he went to Glasgow to continue his education. While he was at the Glasgow School of Art, the Punjab Government’s plans to hire Le Corbusier as the architect for the new capital city of Chandigarh materialized. Prakash moved back to India to be part of this project. This decision radically altered the course of the
young architect’s life; he returned to India, already a transnational agent of modernism and exuberant with enthusiasm to be a part of India’s “tryst with destiny.” The work he did on the campus links Indian and European modernism, showing not just how they differ formally, but also how architects and their designs acted as transnational vectors of ideas.

Of all the architectural imports, perhaps the most famous is Le Corbusier’s *brise soleil*. The indomitable *brise soleil*, one of modernism’s most famous and pervasive elements, was designed to block out the harsh tropical sun, while letting in the soft and necessary breeze. In doing so, the *brise soleil* acted as a universal signal of modernism, and like an invasive species, it traveled throughout Punjab and India, especially in the newly built universities where it took root next to that other crucial Western import: high yield seeds. These transnational transfers of knowledge that brought the *brise soleil* to the global South alongside biotechnological material, fertilizer, and pesticide were not without their respective resistances. Prakash later said of the beloved functional ornament:

> When we started designing houses here we thought of Western houses, we began using those sunbreakers in a very big way, it was very a la mode. But I did a study of the sun in Chandigarh subsequently and found that sunbreakers cut out sun but retained heat and dust. We found it was better to create deep verandas. These keep out rain and sun, but allow life to move in and out as it always has done in an Indian home.\(^{26}\)

Prakash’s critique of the sunbreaker pointed out Le Corbusier’s misunderstanding of the climate in India; he thus began the process of reclaiming Corbusian modernism for the Indian context. However, Prakash only critiqued an error about the element, not the program of rational, climate-responsive architecture. His subsequent mutation of the sun-shading element

into a deep verandah celebrated Le Corbusier’s program of climactic response. Here, architecture was imagined as an instrument of negotiation between man and environment.

The construction of tropical architecture as skin—as a responsive feature that would be able to modulate heat and wind and light through its material properties—ran through the imagination of tropical design, particularly in the work of Maxwell Fry, Jane Drew, and, later, Charles Correa. However, the failure of passive heating and cooling in architectural design could be dated to the early 1960s, when MIT’s solar houses were refitted with conventional heating and sold on the market. This failure was yet to reach the discourse on passive heating and cooling in energy-scarce countries like India. In fact, up until the late 1980s, engineers at the Punjab Agricultural University continued to experiment with passive temperature control even while adding the caveat that humans would have to accept bodily discomfort if they were to adopt these techniques. This research was aimed at villagers who had to resort to solar because they didn’t have access to other forms of energy.

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27 Ironically, the entire state of Punjab is 6 degrees north of the Tropic of Cancer. It is not a tropical environment.
30 Where there is wealth, there is mechanical and electrical cooling. Consider the case of Delhi, where electricity cuts are common and diesel generators are ubiquitous, so much so that when a power grid in North India failed in 2014, wealthy people in the capital did not even notice this massive failure because all their diesel engines kicked in. “The super-rich are less affected by the power cuts that are an almost daily occurrence in much of India. They can afford diesel-powered generators and power inverters that can keep basic electrics such as lights and fans working.” Helen Pidd, “India Blackouts Leave 700 Million without Power,” The Guardian, July 31, 2012, sec. World news, https://www.theguardian.com/world/2012/jul/31/india-blackout-electricity-power-cuts.
However, this is a digression from Prakash’s hostel design. In this project, he inserted large and deep balconies into the sides of his façade, creating black, shadowy voids in the stark, glare-filled Ludhiana sun (Figure 4.6). The balconies of his boys’ hostel and the lack of *brise soleil* on the campus both signal the ideas that Prakash was so eager to give vent to in his post-Chandigarh moment. This hostel was one of his crowning achievements, and he replicated the building on the campus of the Chowdhury Charan Singh Agricultural University in Hissar, Haryana, and in the Himachal Pradesh Agricultural University in Simla.

Prakash’s work was largely devoid of the ornament that Le Corbusier had imprinted into his concrete surfaces. Prakash’s work had a quiet sense of material urgency, without the overwrought symbolism that Le Corbusier had so worked on in his attempt to tie his
modernism into an Indian ethos. Consider Le Corbusier’s symbolic use of the cow, the bull, and the bullock.\(^{31}\) The Swiss architect waxed eloquent about the bull. However, it wasn’t the bull but rather the cow that emerged as important in the technomodern farming economy: the bull was replaced by the tractor and the cow was the locus of production and reproduction as the primary milk producer.\(^{32}\) The bull became a secondary figure in this new economy. The bullock, usually a castrated bull, also suffered a symbolic defeat. The bullock-cart had the distinction of actively destroying modernity, in that it tore up roads designed for pneumatic tires with its wooden wheels.\(^{33}\)

The cow, on the other hand, was subjected to scientific inquiry and imagery: at PAU, it came to embody an aesthetic of scientific progress. Avinash Pashricha’s images for the Rockefeller Foundation and USAID have the quality of an anthropological image of a technological object, framed and photographed as in the colonial documentation of tribes.\(^{34}\) The two images show cows with fistulas which indicate the animals are part cyborg. The image of the cow with a fistula, attended by men in lab coats holding beakers, signified the

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\(^{31}\) To Le Corbusier the bull symbolized both the raw masculine dynamism of rural India and a veritable icon of traditional aesthetics. Conversely, for Nehru the bull encapsulated all the organic power that India hoped to mechanize, but the wheel spoke to a philosophy of dharma, a Buddhist politics of responsibility to uphold sovereignty, law, and freedom. When Le Corbusier wrote to Nehru asking for symbols representative of Indian tradition, Nehru responded with the Asoka Chakra, which was incongruously stamped into the side of a concrete ramp leading to the open hand in Chandigarh’s Capitol Complex, in contrast to the assembly hall’s bull-horn-shaped parasol roof. Prakash, Chandigarh’s Le Corbusier, 17–18.

\(^{32}\) Achyut Kanvinde was the official architect of the Gujarat Dairy Board. Rebecca Brown has argued that the towers of his milk processing factory resemble the ears of a cow, in contrast to the horns of Corbusier’s bull. Rebecca M. Brown, Art for a Modern India, 1947–1980 (Duke University Press Books, 2009), 111.

\(^{33}\) Ateya Khorakiwala, “A Black Carpet of Bitumen; Public Works as Research, India C. 1960.” Unpublished

\(^{34}\) The documentary nature of the photograph resembles the documentation of tribes in an anthropological mode of photography. Zahid Chaudhary writes of the anthropology embedded in the photography of tribes, where the gesture made by the subject of the photos “adds to the cold scientific racial truth invested in the anthropological photograph.” Where Chaudhary’s photographers were aiming to capture a primitivity in the process of the loss of that very same feature, Pashricha’s images are attempting to frame and capture the opposite of that primitivity—scientific inquiry—in its now natural state. Chaudhary, “Phantasmagoric Aesthetics,” 83.
biotechnological nature of the animal (Figure 4.7 and 8). This visual repository worked in direct opposition to Le Corbusier’s autochthonous imagination of the bull, the masculine figure of power and energy, which rings hollow given the staggering resources invested in the Bhakra dam to replace the figurative bull with a different source of power.

The battle between the bull and the cow was a metaphor for a struggle between labor and technology, or, in other words, between authentic, rural, organic power and a genetic, expansive, technologically-enhanced productivity. Prakash toyed with the bull after Le Corbusier, drawing it in profile, exaggerating the hump, while subjecting it to modular drawing proportions. His poem, “The Bull,” whose “streaks of energy pierce through its body,” mirrors these mythologies of ancient, masculine, laboring power in waiting (Figure 4.9 and 4.10). However, the masculine bull was a thing of the past, doubly replaced—its power was replaced by the tractor, diesel, and electricity, and its symbolism was replaced by that of the female of its species, the cow, whose reproductive capacity was to be harnessed in the

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35 Punjab Agricultural University, Ludhiana, December 1964, Photograph by Avinash Pasricha, 0-2908, Rolls 1 to 9, United States Information Service Archive, New Delhi.
36 Photocopy of a drawing of bull and an accompanying poem, undated. Folder D6a, Aditya Prakash Foundation, Chandigarh.
milk industry. The subsequent architecture of dairy processing factories, the iconic works of Achyut Kanvinde, were foundational in India’s modernist history (Figure 4.11).37

Figure 4.9, 4.10. Aditya Prakash’s drawing and poem about the bull. Images © From the Archives of the Aditya Prakash Foundation, Chandigarh.

Figure 4.11. Achyut Kanvinde’s Dudhsagar Dairy for The National Dairy Cooperative Board in Gujarat. Photo © Vikram Bhatt

This dualism of bull and cow invoked an unusual inversion of the masculine-feminine dualism interpreted and reinterpreted as a culture-nature opposition. Here, the

37 Peter Scriven and Amit Srivastava, India: Modern Architectures in History (Reaktion Books, 2016), 222–226.
masculine bull stood in for the culture-tradition-nature assemblage, while the feminine cow principle assembled a technologically-mastered productive and reproductive condition. Another way to ask this question is: was reproduction part of nature or a result of technology? Was woman natural or technical? In cultural and aesthetic terms, anxiety about the technical management of nature, as figured in the feminine body, would play out in unexpected ways.

The College of Agricultural Engineering as a Critique of Ludhiana

Prakash designed the College of Agricultural Engineering after he left the position of chief architect in Ludhiana to return to Chandigarh as principal of its school of architecture. He was very proud of his new building. He had felt deep regret about the previous agricultural college building, where many of his “revolutionary ideas” were turned down and the project took a more conventional turn, but the agricultural engineering college project was his coup. Thapar suggested that Prakash present his design to the American team of experts from Ohio State University and have them incorporate it into their report. The suggestion worked, and the Americans loved the project. Prakash writes that Joseph Allen Stein, who had designed the Home Science building on the PAU campus, loved the building and spread his name in Delhi circles, giving a boost to his image.

The building for the agricultural engineering college faces completely inwards. A blank brick wall with small irregular slits marks the boundary of its square plan (Figure 4.12). All the open spaces are inside this demarcated square boundary. The windows from the rooms look into the inner courtyards, not out at the university grounds. The single storied building contains large classrooms for instruction, administrative sections, and spaces for equipment testing (Figure 4.13). A large roof of north light concrete trusses caps the building. The building is a record of the economic and energy concerns of its time. The spaces are deep, to
keep them cool, but the windows are large, to let in reflected light. The high ceilings and large rooms speak to plentiful real estate, but the brick walls and the single story mark material shortages. The building can be read as an archive of contemporary environmental concerns. This is underscored by the current state of the building, where the windows have been sealed off and the glass painted black, to allow for projectors and air conditioning.

Figure 4.12. Aerial view of Prakash’s College of Agricultural Engineering. The square plan and the concrete north light roof can be seen. Image from Advance, The Punjab Magazine, 1980. © From the Archives of the Aditya Prakash Foundation, Chandigarh.
The form of the building seems to have shut itself off from the outside, from failed prior projects and from deaf officials, to play with space, form, and light on its own terms on the inside. The *jalis* were put up between the courtyard gardens and the building, negotiating light and wind patterns in a completely interiorized environment (Figure 4.14). Yet the building wasn’t so much sealed off from the outside as folded in onto itself in a Foucauldian-Deleuzian invagination in which the architect could rebirth himself, which is precisely what happened.\(^{38}\) The story he tells is worth quoting at length:

> Living on the campus I got the idea that this building should have a SCULPTURE in its courtyard to dignify it. I was living with a building under the realisation and the building materials were sprawled around me urging me to do something. A thought crossed my mind: why not make a sculpture from the very concrete and steel which is being used in the building? I had no experience, only the ‘will,’ but the contractor was willing to help in the experiment. With my clay figure as model, I dug the earth to make a mould and began working on a sculpture, pouring concrete, putting pieces of scrap steel bars as reinforcement, turning, twisting, breaking, remaking. In two-three months’ time the sculpture - a reclining

figure - was ready. When shown to Dr. Mulk Raj Anand, on a visit to the university, he was full of praise for my work. For me it acted like champagne. (Figure 4.15)

Two more things are worth recalling: 1. My rediscovery of myself as an artist, and 2. Broadening of my vision as an architect urbanist.39

Within this interior space of his own architecture, Prakash produced a new subjectivity for himself. If there is any argument for architecture as a subjectivizing apparatus, it is this. In addition, this story speaks to the architect’s imagination of modernism as a moral force in a chaotic world. The Foucauldian double move occurs in this story: first Prakash moves inward, towards self-realization, but simultaneously he moves outward, to become an urbanist. He continues in the same autobiographical essay:

Living in Ludhiana exposed me to the realities of the urban phenomenon. I had to make frequent visits to the old city of Ludhiana from the wide stretch of the university campus, walk through its narrow lanes, observe activities there, cross the Grand Trunk Road which appeared to the divider between the old city and the new. Ludhiana projected itself in my mind’s eye as the city on the crossroads of Punjab destined to rapid growth and industrialization.40

The city of Ludhiana was an important factor in this story, because, by his own admission, Prakash designed the campus to provide respite from the chaotic city outside. In fact, this entire campus folds in onto itself, as a green and open space protected from Ludhiana’s old city. The site was, on one edge, bordered by an irrigation canal, part of the large network of irrigation works coming out of Bhakra Nangal, and on the other, by National Highway 95 (NH95), a major east-west highway running through Punjab (Figure 4.16).

40 Ibid., 15.
Figure 4.14. The college looks in on itself, through screens and into courtyards. Image from *Advance, The Punjab Magazine*, 1980. © From the Archives of the Aditya Prakash Foundation, Chandigarh.

Figure 4.15. Some views of Prakash’s sculpture. Image above from *Advance, The Punjab Magazine*, 1980, © From the Archives of the Aditya Prakash Foundation, Chandigarh.
Your Environment and Waste

While the College of Agricultural Engineering was under construction, Prakash wrote a talk aimed at its students. Entitled “Your Environment,” the essay was written in 1967-68, around the time Prakash’s design for the College of Agricultural Engineering was being built. In his talk, the architect asked the students to be cognizant of their environment, the immediate surroundings in which they lived:

41 The text remains without a date, but the following sentence marks the moment as around 1967-68: “I know your university campus fairly well, because I had a hand in shaping its physical environment. I also know that our college building is not yet ready, and that you are doing your studies under a makeshift arrangement.” Aditya Prakash, “Your Environment; Draft of Talk Addressed to Students of the Agricultural Engineering College,” undated c. 1967-68, Folder D6, Aditya Prakash Foundation, Chandigarh.
I wonder if you feel while entering the precincts of your campus, that you are entering a new environment, an environment of promise, an environment with purpose, a live and healthy environment - in contrast to the diseased and helpless environment of the city. Do you feel that you are in command of the situation inside the campus - and not slave to the environment as in the city!?

In contrasting the “diseased and helpless environment of the city” to the “live and healthy environment” of the campus, he used modernism’s order to perform a stark and conclusive critique of the old, chaotic town outside of this environment. He highlighted the internal nature of the campus, one that referenced Chandigarh as the ideal city while enfolding a piece of it inside Ludhiana. This talk contained none of his appreciation for the fascinating chaos of the old town, only anxiety about its diseased pattern of growth.

“Your Environment” was rife with ideas about how growth was simultaneously vital and dangerous:

Have you ever wondered what is it that has made your movement at certain times even on foot impossible? In certain sections of Chaura bazaar. Have you stopped to ponder why the dingy little Meena bazaar is still so full of life and activity.

You must have gone to the various parts of Ludhiana many times. You must have certainly visited the Chaura Bazaar, visited various picture halls, crossed the footbridges over the railways lines, seen the civil lines of Ludhiana, the Kumhaar Mani, the field Gunj, the grand trunk road, the level crossings, the model town, and many other places. In other words, you probably know your Ludhiana fairly well. But my question is are you aware what Ludhiana is?

In asking this question, Prakash mirrored Nehru’s question, “What is mother India?” Not only did he mirror the question, but he also mirrored the nature of the exchange. Like Nehru, Prakash was speaking in front of an audience and asked the question in a rhetorical fashion, with a reveal that was supposed to change the way in which the audience were to think of the topic. In the case of Prakash, his answer to his own question is: “Does it occur to you that

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42 For a longer reading of Nehru and Bharat Mata see chapter 1 of this dissertation.
Ludhiana is a very sensitive organism?” Here again, the metaphor of growth floated to the surface.

The masterplan of the university reflected anxiety about the old city, while also documenting its fascination. Prakash’s archive contains only a few blurry photos of the city market; all his attention was focused on the campus. The tension between vitality and chaos that lurked in the old cities of India is a theme that resonates throughout the work of architects. In Prakash’s collection of drawings are sketches of the ghats of Benares. Benares, for much of the late nineteenth and twentieth century, represented the ideal Indian city, impervious to the evils of industrial modernity. The image of the ghats, painted from across the river, became a staple of the picturesque imagery of India, beginning with Thomas and William Daniels’ uncle-nephew artistic collaboration up to images that even today range between attempting to capture the vitality of the “ancient Indian city” to fetishizing its oriental beauty. The view of the ghats (steps) constitutes a genre onto itself (Figure 4.17).
Prakash’s “Your Environment” address is another important piece of evidence about how Indian expertise was configured. Chandigarh and Ludhiana came to represent two alternative futures for both Punjab and India. Their difference mapped not just an aesthetic difference but also a vital one: “Have you ever wondered what is it that has made your movement at certain times even on foot impossible? In certain sections of Chawra Bazaar. Have you stopped to ponder why the dingy little Meena Bazaar is still so full of life and activity.” In Prakash’s imagination, agriculture was civilizational, but art came even before that: “It is my belief that art was created with the man - like hunger, thirst, sex.” We arrive a situation where there are two kinds of growth, one negative and one positive. Cities growing
uncontrollably mapped onto the corrupted model of growth while agricultural increase was the controllable, calculable, desired kind.

Embedded in the vital question of growth was a moral lesson in which beauty was not simply a visual and emotional pleasure but rather a moral guide to an efficient and thoughtful future. In contrast, ugliness bred disease, both physical and mental; for Prakash (and Randhawa as the next chapter will elaborate), it was ugliness that needed banishing via art and architecture, which were far more fundamental to the human experience than agriculture. The vital versus moral nature of growth is a thread that runs through this dissertation—when we consider the Geddes to Ehrlich trajectory, we go from evolution to eugenics, from growth to morality.

The other beast that began to raise its head in this discourse was the “environment.” When Prakash uses the word in 1967, he is referring to the immediate, affective surroundings of people as they navigate cities and campuses. In a 1973 conversation, he uses the word “ecological” when describing the imbalance created by industry and population. The use of the word “ecology,” in an article about architecture, was unique in the essay (and in the broader discourse), where most other writers’ references to “environment” were in the immediate, affective sense of the built environment. In 1984, Prakash wrote an essay for the environment society of Chandigarh, where he used the word “environment” as coterminous with “nature.”

This dilemma about what to do about cities dogged Aditya Prakash throughout his career. As principal of the Chandigarh College of Architecture, he saw himself as a ward of the city. The strength of his work is that he allows the dilemma of the city space in his text.
no point does he suggest clear and authoritarian solutions. Rather, each problem offers him an opportunity to suggest a design solution.

I propose a tripartite analytical system to consider the dilemma that animates Prakash’s work; then I look at what new kinds of ideas he had to invent to solve these problems. Further, I examine how these ideas resonate with larger discourses going on across the world and how Prakash injects all of this into architectural exploration. The tripartite analytical system that I have drawn from Prakash’s texts is as follows: the lived city, the ideal modernist city, and, finally, thoughtfulness as a mode of investigation. One example of how Prakash uses this tripartite system occurs in an undated piece of writing, perhaps from around 1974-75. He begins with the observation that a slum is first consumed as its image—overcrowded, congested, narrow, dark, dilapidated, and poverty stricken. He then pulls apart the adjectives: for example, “overcrowded” and “congested” could also apply to the space in a train or an airplane, but in that context, they remain unproblematic because those spaces are designed to be high-density.

Prakash separated morality from design. By this definition, a slum was that environment which does not fulfill the requirements of living, working, and caring for body and spirit. And so, through the process of reason, he transforms a technocratic definition of a slum into a design problem. Through this, Prakash provides a model for how modernity should work: we should redefine things to make them operational. Again, here, Prakash’s work resonates with Le Corbusier’s idea of the ship as a perfect example of dwelling in modernity, where modernity corresponds with efficiency.

43 Random Harvest, Folder D88, Aditya Prakash Foundation, Chandigarh.
In keeping with this idea of efficiency, Prakash writes about waste as that which is not usable for the purpose in hand. The purpose at hand, he offers, is “economic viability,” which references developmental theory. This theory resonates clearly with the idea of untapped resources as wasted resources, encapsulated by juxtaposition of the photo of a waterfall with an engineer exclaiming, “What a waste!” (see Figure 3.23 in Chapter 3) Prakash mirrors developmental theory in which European capitalist growth was predicated on colonial conquest in the non-West: the non-West’s conquest would now be based on the conquest of natural resources.44 Yet Prakash also questions this widely accepted idea of waste as the only interpretation of inaccessible natural resources:

We could consider the Sun’s energy also as a “waste” of energy in space. But if we contemplate, that it is only a small FRACTION of that WASTE of energy that all life on this earth is sustained, then perhaps we have to rethink about the use of the word “waste.”45 Rather than classify wastage as that which we are not able to use (the waterfall), he classifies it as that which we do not use even as we process it. He reframes waste as the polluting byproducts of industry. And so Prakash, ever the architect and custodian of the city of Chandigarh, reframes the developmental problem of “waste” into the more manageable problem of wasted material in the city. In conclusion, Prakash’s experience of designing the campus is foundational to his career and also foundational to his connection to the state.

Living in Cities: Ludhiana

Some years later, Prakash wrote a paper entitled, “Living in Cities: Ludhiana,” which, in his autobiographical essay in Advance, he referred to as the “landmark paper of his

44 M. S. Randhawa, “Natural Resources of India (a Brief Statement)” (Government of India, Planning Commission, 1963), M. S. Randhawa Archive, Punjab Agricultural University Library, Ludhiana.
career.”46 His sketches on a blueprint of Ludhiana express a relationship between the campus, the old city east of the tracks, and the new city some distance away to the west (Figure 4.18). Two major roads went through the city, the Grand Trunk Road, labelled National Highway 1, and the perpendicular Ferozepur Road, labelled National Highway 95. The map also marked out the major growth that had occurred, mostly around NH1, which ran north-south through the city right by the railway line, although a bypass has been constructed to reroute traffic around the old town.47 The drawings on the blueprints marked the major elements that Prakash would discuss in his paper.

“Living in Cities: Ludhiana” was a part of a series of studies that Prakash planned to do about various cities (he wrote one more on Chandigarh). The studies documented the nature of the cities themselves, asking what exactly cities were—a problem that had long since bothered Prakash. These writings mark the kind of dilemma that an architect and urbanist might encounter, especially in a city like Ludhiana, which grew around the Grand Trunk Road as a historic expression of its location on a trade route.48

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47 Blueprint of a map of Ludhiana with sketches, Aditya Prakash Foundation, Chandigarh Punjab.
48 Prakash, “Your Environment.”
The four years that Prakash spent in Ludhiana shaped his thought and gave him a counterpoint to the ideal city of Chandigarh, dubbed the City Beautiful. Chandigarh’s modernism gave the architect a lens through which to critique Ludhiana. Later, this would flip, and Ludhiana would form a lens through which to critique Chandigarh. This process sharpened the modernist in Prakash, not simply in formal terms, but in terms of the modern systems that made an urban body function:

Chaura Bazar is chaotic but a fascinating world, otherwise how could it attract such crowds. People come over here for sight-seeing. Sometimes I wonder if it is worthwhile thinking in terms of resolving the chaos that is Chaura Bazar. Does it need some sort of surgery? Or should it continue to be as it is. I would rather let it be, but I see that the events of life of this city would not let it. The traffic in Chaura Bazar is bound to reach a crashing point sooner or
later. Glimpses of such an eventuality are visible even now when a hand cart faces another hand cart and no one gives way.49 (Figure 4.19)

Throughout the text, Prakash grappled with the task as hand: what to do? Where to go? What exactly was the problem at hand? It was not a simple answer, nor was it a coherent question. The only point around which Prakash’s observations were articulated with certainty was that of the poor quality of the lived experience—which is to say, a life that is cramped and narrow, “if you are lucky, you increase your bank balance, you buy a few extra saris for your wife, obtain a radio or other gadgets of the modern civilization which are supposed to provide enjoyment of life. But by and large you continue to live in the same old, filthy, squeezy, unsanitary way, if not worse.”50

This was a searing indictment of modernization: life might be worse than it was before. I would argue that the Punjab Agricultural University was left out of the canon because Ludhiana is so far out of the architectural network that there were few advocates for the project as histories were being written. In outlining his difficulty with the city, Prakash discovered an important spatial problem: that growth is not something that happens at the edges of a city. Rather, growth happens at every point and in the life of every person. Where could families and industries go when they grew? What new space could they occupy? Were cities doomed to burst at the cellular level? At this point, he refined his question: How do we grow? How do we create plans for cities that have the capacity to expand on the inside?

This question, inadvertently, leads us to examine the ways in which urban life has defined the nuclear family against the Indian joint family. If the family were to grow in the joint style, then the house would need to grow. If the house could not grow, then the family

50 Ibid.
would have to split. The physical constraints of the city force the family to splinter or to accept cramped living conditions. Further, the family becomes analogous to industry, and consequently the way in which property is imagined itself becomes a problem: property and family are not something fixed for life, but rather an exchangeable commodity, an aspect of one’s life that too can be liquidated.

Figure 4.19. Prakash’s overexposed image of Chaura Bazaar. © From the Archives of the Aditya Prakash Foundation, Chandigarh.

Conclusion: Ludhiana as a Critique of Chandigarh

The metaphor of growth came to dominate the developmental project after Nehru and Le Corbusier: the growth of agricultural produce, the intellectual growth of farmers, the evolution and rebirth of architectural form, and finally the growth of cities, which resulted in a general urban turn. After the Green Revolution, the metaphor of growth became all the more
powerful in the possibilities, both positive and negative, that it brought. So powerful was Ludhiana’s story of agricultural productivity that Prakash found himself reversing the direction in which his comparison went. Prakash’s new perspective on Ludhiana was best encapsulated in his 1984 autobiographical story about encountering the idea of ornament as non-useful by definition:

Long ago, as a student of architecture I began to read a book entitled ‘Seven Lamps of Architecture’ by John Ruskin. In this book in the very first chapter it was stated that only that portion of a building has aesthetic significance which is otherwise useless. My sense of values rebelled against this approach and I could read the book no further. I felt that aesthetics and beauty has to be, or at least can be, USEFUL also. With the passage of time, even if my value judgment has not changed, my observations tell me that Ruskin was right and I was wrong. … Chandigarh is called the “The City Beautiful” because it is totally unproductive.

At the same time, the campuses of Agricultural Universities at Ludhiana and Hissar have all these productive elements juxtaposed with the human habitation and activities. They have shown that animals are no more dirty or ugly than the human beings. … There was a time when we as children could pick Jamun, Shahtoot, Amla and Imli for free from the trees growing along the road. But now I find, because of the invasion of aesthetics, all these privileges are banished from our midst. Aesthetics has to be unproductive, useless, and sterile. 51

The campus and its environment challenged the architects, newly trained in Chandigarh under the tutelage of Pierre Jeanneret, to reconsider the relationship between body, city, architecture, and nature. Embedded in this story of the inversion of regard from Chandigarh to Ludhiana was another story—the rise of the urban as a site of sociological inquiry. In the process, Indian architects turned to different approaches to design, not only in Ludhiana but also in Chandigarh. The campus, thus, remains a vital archive of the experiments required to transform a Corbusian modernist aesthetic into new bioaesthetic subjectivities: that is, bodies engaged in the vital and chaotic urban reality of Ludhiana, but

immersed in a reproductive, bountiful, agricultural imagination of nature, incubated in the inward turn, the fold of the campus of the agricultural university.
Chapter Five

Bioaesthetic Subjectivities and the Remaking of the Farming Body

This chapter examines the concept of bioaesthetic planning, defined as the scientific insertion of flora into manmade environments, as a means for reading historical change during the India’s Green Revolution. In this historical moment, we find the Punjab Agricultural University under the aegis of the art-loving phycologist (algae scientist), civil servant, and administrator, Mohinder Singh Randhawa, who experimented with agricultural and aesthetic modernity, transfiguring the commodity of grain and the figure of the peasant along the way. Randhawa, embedded in an international cadre of expert institutions and state agencies, formulated bioaesthetic planning in a state deeply wounded from its violent partition. The concept was meant to anchor rampant haphazard modernization with a moral core of beauty—putatively humanity—with the farmer remade as a modern agriculturalist at the center of this image. This chapter argues that although bioaesthetic planning imagined the city as the site of
aesthetic change, the theory played out on the bodies of farmers and peasants, as subjects
drawn into agricultural modernity in Punjab’s changing productive countryside.

Mohinder Singh Randhawa came to the Punjab Agricultural University in the
position of Vice Chancellor in 1968, at a moment of crisis in the planning process. Aditya
Prakash had left his position to return to Chandigarh and become the principal of the
Chandigarh College of Architecture, and P. N. Thapar had suddenly retired because of his
failing health. The new Vice Chancellor arrived at the post at a point when the Green
Revolution was just beginning to show results in Punjab. In spite of the technological turn in
the state, the country continued to be in crisis from the failure of the third Five Year Plan. The
plan failed largely because, in 1962, resources devoted to growth had been urgently diverted
towards the Sino-Indian war, a devastating event which was closely followed by Prime
Minister Nehru’s death in May 1964. Nehru’s death brought Chidambaram Subramaniam, the
new Minister of Agriculture, into the cabinet; he is remembered for his role in transforming
agriculture. Because of these crises, the government declared a planning holiday after the
third Five Year Plan came to a close. This holiday continued for three years, two of which—
1966 and 1967—brought severe drought, crippling efforts to spread technologically intense
agricultural techniques.

In the 1960s, the Akali Dal came to power, demanding their own Punjabi-speaking
state. The chief minister of Punjab, Pratap Singh Kairon of the Congress Party, who had been
instrumental in launching the University, resigned from his position in 1964 amongst
allegations of corruption and in 1965 was assassinated. Following this, the Akali Dal’s
demands were fulfilled and, in 1966, Punjab was divided into three pieces along linguistic

1 Prakash, Chandigarh’s Le Corbusier, 141–143.
lines: the mountainous territories were merged into Himachal Pradesh and the Hindi/Haryanvi speaking region was given autonomy as the state of Haryana. The reorganization of Punjab saw Chandigarh become a Union Territory, performing the role of capital to both states. The agricultural university too became contested, and was divided with the Hissar campus going to the Haryanvi state (Haryana) and the Ludhiana campus to the Punjabi one (Punjab). Another small campus in Palampur—for which Prakash had also done some masterplanning work—went to Himachal Pradesh. These divisions, coming at the inopportune moment of the planning holiday, saw the schools’ funding “dwindle to a trickle.”\(^2\) In 1968, the founding Vice Chancellor P. N. Thapar suffered a stroke that left him paralyzed, forcing him into retirement. It was at this troubled historical juncture that Mohinder Singh Randhawa came to occupy the post of Vice Chancellor of the Punjab Agricultural University.

**Neo-Malthusian Spectres (Famine 2.0)**

If the internal problems faced by India were not bad enough, the United States continued to have Cold War anxieties about the global South. In 1967, William and Paul Paddock released a book with the rhyming title, *Famine - 1975. America's decision: Who will survive?* The authors presented math supporting their argument that the US should stop all PL480 wheat donations to “hopeless countries” like Egypt and India, because when the famine came, these countries would fail no matter how much support they received.\(^3\) The book was closely followed by Paul and Anne Ehrlich’s *The Population Bomb* (1968), which

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praised its predecessor for facing an ugly truth and proposing the difficult solution of triage to world’s impending apocalyptic problems.⁴

Triage, as the Paddocks proposed, was a legacy of Western medicine: the technique was used on the French battlefield to determine which injured soldiers should receive scarce penicillin. In times of scarcity, triage separated victims into three categories: those who would recover regardless of medical treatment, those who would die without treatment, and, lastly, those who would die regardless of treatment. In times of medical scarcity, only the second group were to be given medical attention. The Paddock brothers applied this formula to the hypothetical condition of scarcity in food; for them, India fell into the third category. Shiv Vishvanathan argues that triage was a fundamental category of developmental thought, as a way to dispense with the “other” who would not adapt, no matter how much modernity they received.⁵

In 1968, right before his term as the Vice Chancellor of the Punjab Agricultural University, M. S. Randhawa served on the editorial board of a publication entitled, *Explosion Hunger—1975*, edited and published by L. T. Karamchandani. The book is a compilation of texts by experts in India’s food sector, who contributed chapters on the challenges faced by the country and the different ways in which these obstacles were to be addressed. It was published in direct response to the apocalyptic famine scenarios detailed in American pamphlets. The title, while dramatic, was nothing out of the ordinary; in fact, it was part of a historical moment in which analogies between the Cold War atomic threat and the increasing

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population of the world were common. Most famous among these is Ehrlich’s “population bomb,” which is almost a synonym of the title at hand, “explosion hunger” (Figure 5.1).

The use of the term “population explosion,” argues Matthew Connelly, was entangled with the history of the hydrogen bomb, where nuclear technology was seen as the only way to defeat war premised on massive human armies. This same technology, in its capacity for massive destruction) was seen to have a Malthusian possibility. It would help society transition from a stage where mortality was low (thanks to medical advances) but fertility was high to the end state where both mortality and fertility would be low—a process termed “demographic transition theory” by researchers. This was a neo-Malthusian

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6 This teleological imagination mirrored Rostow’s stages of the growth of an economy. The first stage was a preindustrial society where both fertility and mortality were high, and the second was an industrial society where fertility was high but mortality was low. In the third, both fertility and mortality were low. Embedded in this rational and teleological imagination of progress was the moral panic that Third World countries would have access to Western technologies, leading to low mortality without the corresponding
interpretation of famine—that is, a Malthusian argument cut through with eugenic control, where high populations were thought to lead to a genetic decline. This idea had roots as early as 1877 in the work of Annie Beasant and Charles Bradlaugh, but gained traction in the mid-twentieth century when European populations declined after World War II. This was in direct contradiction to the lessons of the Bengal Famine, which economists demonstrated had occurred as a result of problems in distribution, not of shortage.

In 1968, India was facing an acute shortage of food. Karamchandani’s volume took stock of the food situation from the perspective of the state while laying out a plan for the future. On one hand, it celebrated the early results of the Green Revolution, and on the other, it stressed the need for further increases in mechanization. The book adopted the language of the Ehrlichs and the Paddocks, while mitigating their apocalyptic imagination of the future:

The prophets of doom and gloom are still around.
Agricultural prospects are still being spoken of in dark and doleful terms.
Malthusian spectre is still being seriously feared by many.

The word “famine” was rarely used, and the Bengal Famine was no longer a direct reference point for arguments about food scarcity. Rather, Bengal was referenced obliquely, through words like “scarcity,” “population control,” and, most importantly, through the threat of the “Malthusian” outcome. For example, in his 1972 convocation address at the Punjab Agricultural University, Robert Chandler remarked,

As has been mentioned so often lately, in 1798 the Rev. TR Malthus predicted man’s ruin unless the human population is controlled. … During the 1940s and 1950s it looked as though the Malthusian theory was to be proved correct, for rice and wheat yields in developing low fertility, while First World countries would see their populations fall. Connelly, Fatal Misconception, 116.

Annie Beasant and Charles Bradlaugh were proponents of this idea as early as 1877, but the concept would gain traction as Europe saw its population drop after World War II. Ibid., 88.

countries remained constant while the population kept on increasing - in fact at a rate greater than before.\(^9\)

While this was not factually untrue, it was an incomplete description of the political crisis facing the world in the 1940s and 50s, where war was a critical factor in hunger crises.

Chandler, who was the director of the International Rice Research Institute (IRRI) in the Philippines, spoke of the scientific advances that rice had seen under his administration and congratulated the science and technology community across the globe for averting a Malthusian disaster, while charting a future that would solve problems the same way. Yet his speech was bleak in its account of population growth and India’s failure to alleviate poverty:

Thus, those of us who look at India from the outside are struck by the enormous amount of hardcore poverty in the country. It seems to us that a large segment of the Indian population is born into this part of society and that they have little chance of benefitting from the agricultural and economic development taking place.\(^10\)

Chandler’s positive invocation of Malthus—although we faced difficulties, we have grown, yet there is a long road ahead—was not the only form this reference took. Consider a memo medical scientist Alan Gregg of the Rockefeller Foundation wrote to his colleagues: it proposed a hypothetical scenario in which an island was inhabited by deer. The deer were kept in check by limited supplies of water, predators, and limited food. What, he asked, would be the consequences of giving them food and water, and killing their predators? And what would be the consequences of turning these supplies off? Then Gregg argued that in his

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\(^9\) Robert Chandler, “Convocation Address, Punjab Agricultural University” (Punjab Agricultural University, Ludhiana, March 15, 1972), 4, Box 100 Folder 668, RF 67 Series 5.2, Rockefeller Archive Center, New York.

\(^10\) Ibid.
opinion teaching Indians to be self-sufficient was the best way forward. He ended his letter: “Indians are not deer, but they are still dependent.”  

At the time, Gregg was based in Bangalore, and his memo was circulated among various departments in India. Gregg used the word “Malthusian” to refer to the history of India’s hunger problem, thus claiming it was a technical one of low production, even though there was a large body of literature arguing that it had been a political failure of distribution. Thus, Gregg and Chandler’s writing was a part of the milieu of works that were all in conversation with each other about population and scarcity. They set the tone (and the date of 1975) for how the world should think about food issues in the future. Although in the past hunger had been a byproduct of the failure of administrative mechanisms in crisis periods, in the imagination of the future, the only kinds of failures were those of shortage. “Malthusian” acted as a euphemism and as a signifier for famine.

Thus, there was a consensus among experts that when it came the Third World, a Malthusian famine was at hand. This was the case even though other industrialized nations were overproducing grain and facing market crashes from gluts. The cognitive dissonance of this problem is apparent: India was caught up in a nationalist ideology of self-sufficiency and struggling with a huge displaced population, especially in urban locations, because of the churn of partition. All of this furthered the cause of technocracy, which we see in miniature in Karamchandani’s book, Explosion Hunger—1975. The postwar recovery of Malthus was crucial in establishing the apocalyptic narratives that firmly installed post-Nehruvian technocratic regimes.

11 Alan Gregg, “Memo: Precarious Welfare,” December 10, 1951, Box 1 Folder 1, RF 1.2 Series 460, Rockefeller Archive Center, New York.
One of the main sites through which this technocratic imagination of agriculture was distributed to rural farmers was the agricultural university. This chapter on the Punjab Agricultural University ties together narratives of tropical discourse and hygiene, order and rationality, and the aesthetics of modernity within the purview of architectural and urban design thought. How did techno-modern India imagine the space between the city and the countryside?

Mohinder Singh Randhawa, a senior bureaucrat in the Punjabi government, served on the editorial committee for L.T. Karamchandani’s Explosion Hunger—1975. A technocrat and an aesthete central to the Punjab Agricultural University, Randhawa began his career in the United Provinces where he gave his civil service exams and entered the bureaucracy. He was posted to Lahore after World War II, and, at independence, he was invited to Delhi to handle the independence transition organization. Soon after, he was posted to Chandigarh, where he worked in the administration for the construction of the new city and came into contact with Le Corbusier’s ideas. Randhawa is a legendary figure in Punjab. He is reported to have been the person who discovered Nekchand’s art and supported it. Randhawa also befriended Jeanneret and eventually led his funeral, following his wishes to have his ashes scattered in the Sukhna Lake. After his time in Chandigarh, Randhawa came to Ludhiana to take over the Punjab Agricultural University—until 1976, when he went back to Chandigarh where he founded a museum of evolution and natural history.

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12 Randhawa was the chairman of the landscape advisory committee who passed the order to “preserve the garden in its original form, free from the interference of architects and town planners.” “M. S. Randhawa,” The Times of India (1861-Current); New Delhi, India, March 6, 1986.

By looking at the extraordinary career of Randhawa, I attempt to address the role of administration and expertise in transforming the Punjabi countryside and the body of the Punjabi peasant. At the center of this chapter is the Punjab Agricultural University, a site of technical and aesthetic modernity that acted connected the ambitions and policy of the central government with the rural hinterland. The university acted as a node linking the varied and sometime contradictory political interests of the state and the central government. Embedded in the larger story of the institution are many narratives, including the way in which tractors came to dominate the countryside as an aesthetic of modernity and how concrete came to represent hygiene and order, in opposition to the messy, chaotic Indian city.

From Algae to Art: Art and Science under the Developmental State

Ek bhaisahab ne ad nikala, paper mein, acche the, agriculturalist the, ke, “I want to get married, ke, ek hi shart hain, ki dowry mein, I want a tractor.” Aur niche jo hain underline kiya hua tha, please send a photograph of the tractor immediately.

A man took out an ad in the newspaper—he was the good sort, an agriculturalist—that said, “I want to get married, I have only one condition, as dowry I want a tractor.” And underneath it was underlined, please send a photograph of the tractor immediately.

-Jagjit Singh, Hoton se choo lo tum, Jazbaat, 2008

In March of 1986, the final volume of Mohinder Singh Randhawa’s four-volume magnum opus, *A History of Agriculture in India*, was published by the Indian Council of Agricultural Research. The book, which prominently featured a tractor and a dam on its cover, was meant to be the final piece of a comprehensive account of the history of cultivation in the South Asian subcontinent. The technomodernity surrounding the farmer in the image—irrigation, power, equipment—showcased the Indian state’s achievements in installing agricultural modernity. The book claimed a teleology of progress towards this moment, whose end point was India’s industrial production of food and its ability to keep famine at bay. Its
author—phycologist, bureaucrat, and administrator M.S. Randhawa—died around the time it was published, at the age of seventy-seven. Mourning his death, the art journal *Roopa Lekhā*, on which Randhawa had served as chief editor since independence, published an autobiographical essay in its April issue. The essay, “From Algae to Art,” appeared alongside a notice of death and an obituary—it was almost as if Randhawa had written his own obituary.14

The title, “From Algae to Art,” bookended Randhawa’s intellectual journey from scientist to art lover. But the title also implied an ideological trajectory that Randhawa saw in the world: a journey from nature to culture, from a scientific interpretation of the world to a cultural expression of that understanding. The title demonstrated Randhawa’s own journey from phycologist to art historian, but its directional prepositions (from and to) also underscored a process by which that which was out there—wild nature—was collected, examined, understood, interpreted, domesticated, instrumentalized, and then represented via art. This process not only marked the complex connection Randhawa made between the wilderness outside and the intellect within, but also mirrored modernity’s transformation of its subjects.

The autobiography glossed over his career as a bureaucrat; instead, Randhawa talked about his experience with art, nature, and beauty. He recounted how, between 1932 and 1934, before he began his career in the civil service, he lived in London. There, he spent every spare moment at the Tate and the British Museum. Although inspiring, these museums made him feel like “there was something unique in the paintings of the Kangra school which [he] was missing in European art. [He] was missing the pure colours, the familiar atmosphere of the

village and also the beautiful landscape of Kangra Valley.” Randhawa’s language moved seamlessly between the painting and the landscape. The boundary between nature and art was blurred, although differently, I would argue, than in the picturesque framing of the landscape as art.

In his text, he recalled his walks through the Indian countryside, exploring “ponds, jhils and fresh water streams.” He carried his microscope, and while “others were shooting ducks,” he collected algae, discovering a host of “microscopic plants, which were new to science,” though “villagers who watched [him] collect these slimy plants could not understand.”

This was the dilemma of modernity which animated the phycologist’s work as an administrator who spoke in the name of the state: modernization brought with it the bourgeois hedonism of duck shooting, yet without its scientific method, the world around remained undiscovered and incomprehensible. Randhawa hoped to suture this break with his own theory of how to bring the curative effect of biology into the haphazard reality of everyday life. For him, bioaesthetic planning—that is, the scientific insertion of flora into manmade environments—was a technique to anchor rampant haphazard modernization with a moral core of beauty.

Randhawa’s interest in art informed his work as an administrator at the Punjab Agricultural University in the 1960s. Three projects that he initiated at the university brought his ideas of art, science, and modern subjectivity together under the rubric of a national imagination of productivity. These three projects were the Museum of Social History/Rural

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15 Ibid., 5–6.
Life, the Museum of Water Resources, and the *Kisan Melas* (farmers’ fairs).¹⁶ Randhawa remade the university and modernized the Punjabi farmer through a pedagogical, cultural, and aesthetic project that was embedded in the technoscience of the Green Revolution in India.

Although he separated his work as an art historian from his work as an administrator, I contend that Randhawa’s interest in art history had consequences for his administration of agriculture. For instance, he looked to art—miniature paintings—to discover which fruits and flowering trees were traditionally part of the Punjabi aesthetic imagination. This conception of the work of art as a document of historical information (Figure 5.2) stood in opposition to conceiving of the farmer as a source of historical and agricultural knowledge; instead, the *kisan* was now forced to become an agent of modernization rather than a

¹⁶ In this chapter I discuss the Museum of Social History/Rural Life and the Kisan Melas. The Museum of Water Resources is discussed in the chapter, *Models and Model Townships.*
repository of knowledge. The farmer was to transfer the gains made in the laboratory into abundance on the land.

Randhawa’s proposals for bioaesthetic planning underscored the aesthetic and cultural project embedded within the state’s pedagogical program for the Green Revolution. The tractor emerged in the visual landscape of Punjab as a signifier of wealth and modernity and as a signal of the changing nature of the farmer himself. The tractor transformed the farmer into an agriculturalist. In this chapter, I trace this aesthetic transformation as part of the ideology of the liberal state as evidenced in Randhawa’s work. His theories of nature skirt the developmental idea of nature as a resource whose defects were to be remedied, yet they cannot be completely explained in that way. Instead I put his ideas of nature in the context of his work as an administrator, his historical writing, and his efforts to aesthetically remake modern space.

Yet it was neither his love of art nor his belief in the artifice of nature that gave him the opportunity to affect change. Rather, it was in his capacity as a bureaucrat and administrator that he modeled his ideal state in the microcosm of the Punjab Agricultural University. Randhawa both purveyed and contested Escobar’s regime of representation in that he actively produced the new aesthetic of farming. Yet it emerged in contradistinction to the USAID aesthetic which was more interested in an authentic documentation of improvement over Randhawa’s interest in making new images embedded in the aesthetics of miniature painting.

Beautifying India: Beauty and the Nature of Nature

Randhawa arrived at the Punjab Agricultural University with a long record of urban beautification behind him. One of the earliest theories that he proposed in this regard was that of “bio-aesthetic planning” in a book entitled *Beautifying India*, published in 1950. Released soon after independence, the book was dedicated to Prime Minister Jawaharlal Nehru and speaks to the enthusiasm for development and planning that accompanied the early years of independence. In the book, Randhawa presented a theory and proposal for banishing ugliness from modern India through bioaesthetic planning. Bioaesthetic planning was not simply “making beautiful,” although beauty was its ultimate goal; rather, it was “defined as the conscious planning of the flora and fauna with the object of beautifying the country. Bioaesthetic planning embraces both the animal and the plant sciences, Botany and Zoology, and may be further defined as planned ecology of living beings from an artistic point of view.”

*Beautifying India* was Randhawa’s first attempt to systematize nature, so that it could be a rationally aesthetic part of India’s planning process. Further, beauty formed the heart of morality for Randhawa, so to beautify India’s sites of growth and development was to provide it with a moral core made of art and life. Later, in another publication, he defined bioaesthetic planning as the “projection of the systematizing and planning mentality of the biologist into the field of everyday life.”

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19 M. S. Randhawa, *Flowering Trees, India the Land and the People* (National Book Trust India, 1965), 60.
Bioaesthetic planning came to mean bringing art and life into the ambit of the developmental state, from a rational, universal, scientific perspective. “The planning of our cultural and aesthetic life,” Randhawa wrote, “is a necessary concomitant of the planning of our social and economic life. While we are planning our industries and agriculture we can
hardly ignore the environment of human beings.” Bioaesthetic planning involved a moral interpretation of beauty, which scientifically targeted the development and planning project launched by the state (Figure 5.3, 5.4, 5.5).

Development, in this period, emerged as a new form of knowledge. It was a new way to interpret the relationship between politics and economics. The Indian economist, Sukhamoy Chakravarty, described the new economic theory as consisting of growth plus structural change. The first Five Year Plan, which was released in 1951, declared that planning was to tackle the “problem of development”—that is, to bring modernization but also modernity. Planning was an attempt to bring structural change to India’s economy, transforming it from an extractive to a productive one. Randhawa never directly critiqued the state’s planning project. However, in his work, he argued that planning theory had not considered the moral and aesthetic component of beauty: bioaesthetic planning was a critique of the technocratic development project.

For Randhawa, “bio” referred to biology in the scientific sense, meaning “organic substances, life, or life processes.” However, he uses it to mean not simply life, but rather life or nature when scientifically ordered and understood. The bioaesthetic constituted an aesthetic interpretation of life that was scientifically ordered. The aesthetic of bioaesthetic planning raised nature into beauty and morality. In a piece entitled “Bioaesthetic Planning Versus Wild Nature,” he categorically explained that contrary to common ideas, nature was neither natural nor beautiful:

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There is in some of us an undiscriminating and irrational adoration of nature. People who have never grown a herbaceous border of annual flowers in their own house, burst out in panegyrics on seeing a clump of anemones or potentillas in the hills. It is far from my intention to decry the beauty of alpine flowers in the Himalayan meadows.\textsuperscript{21}

This idea of nature, he argued, derived from nineteenth-century British Romanticism:

It is only in the nineteenth century that educated people began to admire beauty of the mountains and forests. In India the educated classes are under a heavy debt to Wordsworth for inculcating the love of nature.

But nature, he clarified, has had a long and more violent relationship with man:

About 150 years ago in Europe and about fifty years ago in this country, the common man was afraid of wild country, mountains, lakes and forests. Mountains and forests were regarded with a feeling of horror.

Ironically, his description of nature-as-horror itself owed debts to the Burkean sublime, and he struggled to locate the natural and the beautiful object:

On the other hand, I hold that in the magnificent setting of the Himalayan snows a planned alpine garden will look much better than anything nature has ever produced. Untamed nature is disorderly, chaotic and wayward.

Randhawa finally concluded that, in fact, there was no beautiful and natural nature; instead, the very things society considered beautiful were the result of years of human intervention:

Man has been constantly fighting his environment. He battles with nature to produce a semblance of order. He clears the jungle, breaks the virgin soil for cultivation, diverts the courses of rivers, makes canals and embankments for irrigation and converts wasteland into parks and gardens. While in some cases he has produced ugliness by his haphazard, uncontrolled, and misdirected actions, in other cases he has been able to improve upon nature. Who can deny the beauty of the poplar lined roads of France, the vineyards of the Rhine, the tulip fields of Kashmir, and the hedge rows of the English countryside? Those who admire the beauty of the English countryside forget that it is the result of hard work of many generations.

Randhawa cited Hogben as his primary influence here:

\textsuperscript{21} This, and all following quotes from Randhawa, \textit{Beautifying India}, 3–4.
Describing the evolution of the English countryside, Lancelot Hogben writes, “What generally gains admiration for the beauties of the English countryside is not nature as such. Untouched nature is generally monotonous. English parklands, hedgerows, and many of our woodlands are the result of human interference, sometimes by the deliberate action of enthusiastic pioneers of bioaesthetic planning, like John Evelyn, and sometimes as relics of past cultivation.” Similarly the wonderful landscape gardens of Japan are the result of toil of generations.

Figure 5.4. Randhawa’s tree plantation plan for India.
Randhawa borrowed the word “bioaesthetic” from Lancelot Hogben, a Cambridge-trained, British biologist who, in a tradition reminiscent of Geddes, began studying biological mechanisms but became interested in social transformation. He is part of a lineage of scientists who considered their discipline to be either a metaphor or a mechanism with which to interpret the social world.

The rise of social biology as a field was a consequence of the gene becoming the subject of a broad Darwinian epistemology of the world. In the view of the biologists, because evolutionary theory had led to man’s rise as a social being, the biological sciences subtended the social sciences: society is the evolutionary end of the human as a biological condition. Figures like Karl Pearson, Patrick Geddes, Arthur Thomson, and Lancelot Hogben came to think of the social sphere as an evolutionary formation, to which a “scientific-humanistic” framework could be applied. Geddes’ textbook, *Life: Outlines of a General Biology*, written with his student and collaborator Arthur Thomson in 1931, is a stunning example of the
“discussion of the relations of Biology to Sociology,” with the hope of understanding biology as more than a simple set of mechanistic functions and instead as a socially adaptive process.  

After World War II, these early intellectual developments provided a foundation for postwar neo-Malthusian thinkers, many of whom were also biologists, to foretell various futures, either apocalyptic, where modern society would end in famine, disease, and nuclear holocaust, or celebratory, in that technological solutions would solve the food crisis and usher in a golden age of capitalism and peace. This eschatology was embedded in their nuclear era.

Among these was Paul Ehrlich, also a biologist, who deemed the battle to feed humanity over, thus drawing a historical link between agricultural production and scientific humanism. His model claimed an evolutionary eugenics, where the choice as to who would survive would emerge, rather than had to be made – a social survival of the fittest idea. Another iteration of this biological episteme—in contrast to Ehrlich’s environmental eugenics—saw the emergence of the critical field of political ecology.

John Perkins argues that the origins of political ecology came from the scientific recognition of the gene as a site of research. Research and innovation around genetically hybrid seed varieties provided a route for capital to move from the United States, first to Mexico, and then to India. Cold War economic and political logics played out in the agricultural realm in the Third World.  

However, Hogben’s version of social biology did not tend towards eugenics. Rather, Hogben called himself a scientific humanist—a term popular in the 1940s for envisioned a unification of the physical sciences and the humanities.

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23 Perkins, Geopolitics and the Green Revolution, 5-6.
Randhawa’s life brings the strands of beauty, productivity, and scientific humanism together. He expanded his biological work into what he called scientific humanism. Scientific humanism was a philosophy that imagined combining scientific methodology with the pursuit of broad humanist goals.

The phrase “bioaesthetic planning,” so crucial to Randhawa’s life’s work, was hardly a central thesis of Hogben’s work; indeed, it is difficult to find the word in his oeuvre. Hogben used the word bioaesthetic in a much narrower context than Randhawa came to apply it. The word appears once in his autobiographical travelogue, *Author in Transit*, where, in Japan, Hogben observed that landscape, nature, life, gardens were so intricately intertwined into the urban everyday that the Japanese person walked through garden and city seamlessly and the boundary between city and nature broke down. Further, the Japanese garden and urban space are so precise in their gestures and nature is so carefully imagined that, it seemed to Hogben, you cannot separate out nature and humanity. They are continuously and simultaneously interdependent and inseparable. It is this that leads Hogben to declare Japan a “truly bioaesthetic culture.”²⁵

Randhawa took this descriptive term from its Japanese context and applied it in a prescriptive mode in India’s planning project. This move also recalls Japan’s Buddhist heritage, linking it tenuously back into an Indian religious and aesthetic history. Randhawa does not make this argument in completely facile terms, but rather talks about the ways in which gardens across India, China, and Japan remained connected in the sixth and seventh centuries.²⁶ Hogben’s work possibly gained traction in mid-century India because the biologist

was deeply concerned about the relationship between a scientific mentality and social change. This led him to write two popular books, both of which became bestsellers: *Science for the Citizen* and *Mathematics for the Millions*. Both books spoke to Nehru’s call to impart a scientific subjectivity to the citizens of India.27

Randhawa saw himself as occupying a similar academic tradition. Hogben’s trajectory from biologist to humanist mirrored Randhawa’s own movement from a phycologist studying algae to an administrator writing about art. This context gave Randhawa a unique perspective on the world: to him, it was not an aggregate of discrete disciplines, but rather an organic whole of which only small parts could be accessed one at a time—sometimes the farmer, sometimes the painting, sometimes the microscope. However, in the Geddesian tradition, the city and the state were both closed systems in which to experiment with all these different pieces and methods of inquiry. For Randhawa art was also such a synthetic field, where beauty, value, labor, history, and religion came together. Art and science offered ways in which to render orderly the chaos and monotony of nature—to bring about moral change.

Randhawa borrowed the Geddesian term “surgery” to discuss what to do with old towns: “Some would recommend wholesale demolition. But that is an extreme view, idealistic rather than practical. We should improve [cities] as far as practicable. These old towns are in need of drastic surgery.” In another place he said, “our old towns offer little scope for bioaesthetic planning… Planting of flowering trees in an old town appears like draping an old, haggard, ugly woman in a brilliantly colored new sari, which merely throws her ugliness into

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greater contrast.” Immediately obvious is the gendered nature of modernist aesthetics and modern science. Old women, and the female sex of any species past their youthful and reproductive age, are no longer of value to society—not economically, not politically, not aesthetically. To return to the management of the reproductive body as it played out in the bull-cow aesthetic interpretations, cows, seed, and women are each only as necessary as their reproductive labor.

Randhawa meets Le Corbusier: Flowering Trees in India

As Randhawa began his administrative career in independent India, he reworked his theories in his books, revising the same text from varied perspectives. Between 1950 and 1986, and especially in the years between 1960 and 1978, Randhawa’s work on post-independence India, on Chandigarh, and in the Punjab Agricultural University played a part in recalibrating the relationship of the individual subject with modernity, the aesthetics of organized beauty, and the biological casting of nature in terms of agriculture. Over the next twenty-seven years, until 1977, Randhawa added, extracted, and republished pieces of the book under different titles. Later editions reflected contemporary anxieties. In the 1960s, Randhawa reflected American apocalyptic anxieties as to whether India would collapse or take off. From the 1970s, he picked up on the environmental debate and reminded his readers that the word ecology, taken from biology, had become everyday parlance since the environmental movement took hold. One of the first rewritings of Beautifying India took the form of a book entitled Flowering Trees in India. In the foreword to the 1956 book, S. K. Dey, the Minister for Community Development, wrote:

28 Randhawa, Flowering Trees, 61.
What with the greed of man and what with the wrath of nature in turn, our countryside in India is dry and denuded of vegetation which was our tropical heritage in the remote past. No wonder, erosion rules in place of green foliage and desert threatens where green fields prevailed.29

Here, in using the phrase “tropical heritage,” Randhawa’s friend does exactly that nineteenth-century reading of nature as an Edenic past that Randhawa had dismantled. He misunderstood Randhawa when he located beauty in the countryside:

We have been doing a lot for increased food production and better amenities of life such as communications, public health, education, social education and activities in diverse other allied fields. But beauty is the birthright of man living in nature, and this can be provided in the countryside by nature’s peasantry and vegetation alone.30

A crucial difference in this book was Randhawa’s inclusion of a chapter on Chandigarh, where he served as Chief Commissioner; he found Le Corbusier’s city to be a physical analog of his ideas of beauty, transmuted into rationality and order. While his landscape plans for the city embodied his bioaesthetic ideas, the city came to mark the possibility for design. This chapter on Chandigarh is important because it reveals the deep impact the Chandigarh project had on Randhawa’s ideas about how aesthetic ideals can be given a physical form. Randhawa’s conception of order and beauty takes the form of Corbusian urban modernism. They get endowed with meaning from that spatial configuration, and Chandigarh came to embody this ideal.

Randhawa’s enthusiasm for the methods of Le Corbusier, rather than his forms, is palpable. In his essay in the special Chandigarh issue of Marg, he writes, “Corbusier who was one of the members of the Committee, suggested the preparation of a chart showing shapes of trees and colour of flowers. This simple chart presented a classification of selected, beautiful,

29 S. K. Dey Foreword to Randhawa, Flowering Trees, i.
30 Ibid, i.
ornamental flowering and foliage trees of India which may be called the aristocrats of the plant kingdom and provided the basis of all the tree planting in Chandigarh.” It was these ideas of nature, beauty, science, and planning that Randhawa brought to the Punjab Agricultural University in 1968.

Randhawa Concludes

Eventually, Randhawa foregrounded the descriptions of trees and their qualities, pushing bioaesthetic planning to the background. Mentions of Hogben disappeared and only a few of his quotes regarding the English landscape remained. Randhawa, at the end of the twenty years of revision, arrived at this conclusion:

One finds that the essentials are the ideals of truth and beauty. Ultimately the search for beauty becomes the search for truth and tree worship leads to life worship, and the bioaesthete becomes a biospher. While science attempts to extract truth from nature, art abstracts beauty. In bioaesthetics, science and art are welded together and ideals of truth and beauty coincide.\(^{31}\)

The bioaesthetic planner is a master artist whose canvas is the entire country and whose pigments are the flowering trees. He paints the canvas of the countryside in rich colours – blue jacarandas, yellow amaltas, orange-scarlet gul mohurs, scarlet colvilleas, red erythrinas and pink lagerstroeias are with what he paints the sidewalks of roads and the platforms of railway-stations.\(^{32}\)

It makes sense that this passage is in the last of the books because it traces the journey that Randhawa himself undertook—his search for truth and worship that made him, the bioaesthete, into the biospher. As Randhawa explains in the preface, he coined “biospher” as a portmanteau of “bio” as in life and “sophia” as in wisdom.

All Randhawa’s works shared the same core philosophy: that nature was chaos, but biology, by systematizing that chaos into order, could reproduce nature as beauty. Biology’s

\(^{32}\) Randhawa, *Flowering Trees*, 2.
scientific mentality could bring beauty into the city, the heart of modernization, and, in doing so, help retain a moral core that had been eroded by the abrasive conditions of modernity. Thus, beauty was a crucial and pressing piece of the puzzle of progress if the state wanted to prosper over the long term.

Making a Farmer's University

In 1966, Randhawa moved back to Chandigarh; two years after he took the position of Chief Commissioner of the capital city, he left to become the Vice Chancellor of the Punjab Agricultural University when, in a moment of crisis, the previous vice chancellor suddenly became very ill. Randhawa brought the previous twenty-seven years of contemplating the aesthetics of the environment to the campus that then became the site of his interventions. While at the University, Randhawa’s enthusiasm for the strides of modernization in independent India came up against the numerous obstacles faced by the development project. The revisions he made to Beautifying India speak to new concerns such as shifts in rural life and farmers watching TV and becoming victims of lifestyle diseases. Yet, his resolve towards painting the country with trees remained. This resolve manifested in his offer of free landscaping services through the university. The idea that landscaping had the capacity to better the world was something that Randhawa took very seriously. This offering for free landscaping services was a sincere and heartfelt attempt at manifesting his theory of bioaesthetic planning.

Of the eight years that he spent as Vice Chancellor of the Punjab Agricultural University, Randhawa wrote:

I took over as Vice-Chancellor for agricultural education in 1968 and continued till 1976. During this period, the college of Veterinary Science was started at Ludhiana. A number of new buildings, e.g. the College of Basic Sciences and Humanities, Kairon Kisan Ghar, the Central Library, the Museum of Water and Power Resources of Northern India, the Museum of Rural Life of Punjab, Students’ Home and Communication Centre were built. New crop varieties were discovered. They made the Green Revolution in the State a reality. I made the University the farmers’ university in the true sense.34

What did he mean when he says that he made the university the farmers’ university?

Universities not only trained agriculturalists, but also trained farmers in modern techniques of agriculture. This training of farmers, dubbed “extension services,” was an important structural shift in the modern hierarchy of educational institutions, which hoped to form a bridge between the state, its new technologies, and the rural countryside. The agricultural universities were given the crucial task of bridging the divide between the state and the central government and of serving as as reliable conduit of information. The universities were structured so that they received grants and assistance from the central government and the Indian Council of Agricultural Research (ICAR) but controlled their own academic curricula. The universities subtended a complex set of institutional hierarchies that allowed the center some amount of uniformity and control over what was otherwise a haphazard set of interventions in agricultural research.

Thus, to make the university a “farmers’ university” was also to make rural life legible to the structures of the state (Figure 5.6). For Randhawa, this was as much a cultural project as it was a political one. The task of cultural interventions was to suture the various breaks between categories of modernization, such as rural, urban, state, peasant, and so on. It is important to remember that Randhawa was also working to suture the wound left by the partition of Punjab. Randhawa’s endeavor to transform degradation in the city was parallel to

his effort to make the university a node connecting the *kisan* to agricultural advancements made on the campus.

One of the problems that Randhawa saw in the split between the city and the countryside was the break between labor and leisure. In the modern city, nature was no longer accessible as a site of leisure. Randhawa theorized this split as coterminous with the break between the scientific mode of agriculture and the social and cultural history of farming. While on one hand, the university was invested in performing the crucial structural task of taking scientific education to the farmer, on the other, it was invested in preserving the rural life of the farmer as an authentic relationship between man and land.

**The Museum of Social History / Rural Life**

One of the major projects Randhawa initiated to remedy the cultural separation caused by modernity was the Museum of Social History / Rural Life. This project, initiated in
1971, was inspired by the eighty-eight-acre Freelandsmuseet near Copenhagen, which chronicled Danish rural life. The Danish display of farmsteads, barns, and artifacts of rural life collected from across the countryside for the museum inspired Randhawa to begin his own version of the project, which would collect architectural and everyday objects to preserve a glimpse of the quickly changing heritage of Punjab.

The Museum project required a three-pronged approach: acquiring a collection, studying vernacular architecture for the design of the building, and mobilizing public support and funding. For the task of designing a “traditional” building, Randhawa toured towns and villages with architects, engineers, and photographers. Together, they consolidated a set of ideas for what the building might look like. He hired the Chandigarh-trained architect Surinder Singh Sekhon to draw up the design. The building has a square plan with rooms around a central courtyard. One side of this square was to be the historic façade. The rest of the museum has simpler brick walls with windows (Figure 5). It was decided that the façade would replicate the ancestral haveli (large family house) of the retired Chief Justice of Punjab High Court, Mr. G.D. Khosla, from the Rahon district of Jalandhar. To this façade, the architect added a type of projecting window that were typical of houses in Sultanpur Lodhi.

35 There was a boom of open air museums in the mid-twentieth century: Hjerl Hede in Jutland (1930) and the Den Frynske Landsby (1946) are two other examples. See Sten Rentzhog, Open Air Museums: The History and Future of a Visionary Idea (Carlssons, 2007).
Randhawa had hoped to secure *Nanakshahi* bricks from some ruins to incorporate original material into the museum’s building, but the plan turned out to be too expensive and logistically problematic. Eventually, the committee opted for local brick and accepted bricks with modern dimensions, treated with a lime *surkhi* mortar. All the detailing was hand-cut from the brick by masons (Figure 5.8).  

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37 Ibid., 24.
During their research into vernacular architecture, the team acquired three carved door frames, a wooden door, and a false ceiling, and other architectural pieces—many from people reluctant to part with them (Figure 5.5). Randhawa brought with him the power of the state and of national-cultural hegemony; he argued that their architecture would be best preserved in a museum rather than with them. Two of the most important acquisitions were the carved door frame and the painted wooden false ceiling, which were repurposed from a haveli deserted by partition evacuees. The officers from the rehabilitation department reported that the house was now occupied by “some displaced persons from Pakistan.” Here, the
question of suturing the wounds of partition raises its head. Evacuees living in India were
given homes, but not seen as the rightful heirs of these spaces. Again, the cultural and
powerful force of the nation state overwrote any other historical right to architectural
fragments.

Figure 5.9. A view of the Museum, 1986.

As for the collection itself, “wives and sisters” donated their Phulkari dupatta
collections from their wedding trousseaus, men their family’s lacquered beds. Friends and
colleagues of Randhawa offered their furniture, crafts, and jewelry. Farming implements were
donated by various agriculturalists at the university, and equipment being used currently was
put beside archeological artifacts. These donations mapped the landscape of elite society
around Randhawa, all of whom chronicled rural life removed from class and caste inequities
that marked all the artifacts in their use (Figure. 5.10).

38 There is also a gendered current running through this act of collecting: Men donated their sisters’ and
wives’ Phulkari collections. This makes it seem like these women were collectors of textiles, but these
were rather family heirlooms acquired as marriage gifts.
The politics of postcolonial in India, as Arindam Dutta has argued, yoked modernism to the nationalism, putting the aesthetic project in a double bind of having to forge civilizational memory while investing in European modernity. Randhawa’s own work in this regard was schizophrenic. In attempting to preserve a distinctly Punjabi heritage—and in many regards, the exhibits were even more local than the state of Punjab—his project was routed through the Danish imagination of open air rural museums.

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Dutta argues that through its exhibitions India needed to show the world that it was contemporaneously exotic and industrialized. While Dutta’s argument focuses on a moment where India was marketing itself towards capital from the tourism industry, this task of displaying the past in the context of the future was rooted in the liberal developmental imagination of the 1950s and 60s, as the cultural and pedagogical project embedded within the Green Revolution. Arindam Dutta, “Politics of Display: India 1886 and 1986,” *Journal of Arts and Ideas*, no. 30–31 (1997): 115–145.
Additionally, the construction and establishment of the University maps out a certain landscape of powerful elites in Punjab: every arm of the state acquiesced where permissions were needed. The acquisition of the chowkhat (carved door frame) through the coercion of the state demonstrates the controlled nature of representation in the museum. The exhibition itself laid out the implements and tools as they might have been laid out in a house. The kitchen implements, regardless of their anachronistic relationships, were laid out alongside each other, as were pottery, leatherwork, and agricultural tools. In attempting to preserve the seamless notion of “rural life,” the exhibition effectively presented the past as an unchanging state, with modernity as the only break.

The craft of embroidering Phulkari itself spoke to gender and the geopolitics of textiles in north India (Figure 5.11, 5.12):

the word phulkari conjures up happy memories of old Punjab which stretched from Peshawar to Delhi and Ladakh to Multan. It brings to mind several visions of the life of Punjabi women of yesteryears: embroidering her phulkari for her wedding and spinning cotton on a painted charkha.40

The Phulkari collection, acquired from the wedding trousseaus of Ludhiana’s elite women, was a prized possession of the museum. Most of the textiles were donated by Dr. B. P. Pal, the retired Director General of the Indian Council of Agricultural Research, who “donated a collection of sixty phulkaris which had been collected by his sister Kumari Rampa Pal.” The museum brochure states: “women folk used to sit in groups to embroider their dreams in the shape of wonderful art.” The word Phulkari means a patch of garden, and, in this sense, Randhawa’s imbrication of art and nature is not picturesque; rather it emerges from a different history in which color, art, and nature move among each other—not seamlessly, but through craft.

Figure 5.11. A detail of *Phulkari* embroidery, “a patch of garden,” 1986, *Marg Magazine*. 
The museum was couched in the same rhetoric as bioaesthetic planning: modernization is bringing change at an unprecedented pace, tearing people away from their moral core, and this museum with its showcase of rural aesthetic capacity will help connect people back their moral selves. The museum was a point of interface between the agriculturalist as professional and the farmer. The agriculturalist who trained at the institution could now learn about the life of the farmer whom the state was, on one hand, transforming through its technoscientific pursuit of productivity and, on the other, congealing in the museums of its cities. In this context, the museum was juxtaposed with Randhawa’s other major intervention to make the university a “farmers’ university:” the Kisan Melas (farmer fairs).

Under Randhawa, Kisan Melas (farmer fairs; Figure 5.6) became a regular feature on campus, occurring twice a year, before the kharif and rabi seasons. The fairs provided the opportunity to distribute new varieties of seed and educate the farmer about them at the perfect moment. They also became sites where new financial schemes for upgraded
infrastructure could be disbursed to the modern cultivators. Randhawa imagined this structural design of extension education and kisan melas as the university extending its arms out to the farmers and gathering them back into its fold. When juxtaposed, the museum and the mela appear to be sites of exchange, where culture, history, and craft were donated to the university, and in return, machines, seed, and technical knowledge was distributed. This exchange—rather than transfer—of modern technology to the farmer is vividly captured in photographs taken at extension sites: clean-shirted men with watches on their smooth-skinned wrists offer information on plants, diseases, and pesticide to weather-worn men, clad in old clothes, standing in muddy fields. In the process, both the image and the work of the farmer began to shift.

A History of Agriculture in India: Randhawa’s Frontispiece

The most telling image of the new body of the farmer is found on the dust jacket of Randhawa’s life work, A History of Modern Agriculture, Volume 4: it is an image of a tractor and a dam (Figure 5.13). The volume presented a self-contained nugget of all agricultural modernity, cropping the immediately recognizable Bhakra dam to carefully include the entire spillway on the left, and the transmission towers on the upper right. The tractor in the foreground of the image is in a paddy field—a fact made evident by the water depth and the muddy, half-cage wheels which were attached to the tires of the tractor to help with puddling. The edge between the water-filled field and the water of the Sutlej River at the bottom of the Bhakra lies on the diagonal of the collage. The lines where the tractor has been cut out and pasted onto the background of the dam are evident, and emphasized by the images’ different colors, yet the two fragments are sutured back together by the water: the Sutlej River flows directly from the spillway of the Bhakra into the paddy fields of Punjab.
The body of the farmer ties together the disparate elements on the cover. Dressed in a light-colored, collared shirt, he has twisted his well-fed torso to face, and look directly into, the camera. His right arm is outstretched and placed delicately on the machinery hung off the back of the tractor, almost as if he is petting the rump of a bullock that might have been ploughing the field in a different time. The clean, collared shirt with breast pocket is in stark
contrast to the muddy, messy wheels, plough, and wheel cages of the tractor. The tractor in this image takes on all the mud of the field, leaving the farmer completely clean—clean enough to wear light-colored clothes in the middle of a watery field. Compare this to another publicity photograph, made in 1957, of paddy fields being ploughed at the Central Rice Research Institute in Cuttack: here the farmer is constructed in a very different aesthetic frame (Figure 5.14).

Figure 5.14. Farmers are seen ploughing of wet paddy fields at the Central Rice Research Institute, Cuttack. Paddy ploughing is notoriously laborious, with hours spent submerged in water. The bodies of the farmers are in stark contrast to that of the agriculturalist in the previous image.

The art director of Randhawa’s publisher, ICAR, was probably responsible for the crucial tribute to modern agriculture on the cover of his book. What stands out is that it is not a photograph but a collage. The windows in the cage wheels, the outline of the tractor, the
The turban of the farmer—all of these edges have been carefully cut to layer the two separate images on top of each other. The collage constructs for the viewer a very precise representation of the farmer in the developmental state. More than simply displaying of modern technology, the image seems to encode a narrative: the Bhakra was built, bringing electrification to rural Punjab and water to Punjabi fields. These upgrades, along with small-scale new technology such as tractors, have brought prosperity to the modern farmer, who is no longer immersed in the muddy waters of the field, covered in dirt—instead, he is clean, well dressed, healthy, and happy.

The lines of the cut-and-paste collage are crude enough that the maker did not attempt to hide his own artifice. The cutting and pasting was a strategy to excise the past and bring together the difficult and scattered pieces of modernity. After all, Rajasthan, not Punjab, largely benefitted from the water of the Bhakra, and the energy was turned more towards industry than towards agriculture. Yet the image is precise in another way: the farmer has been transformed in the eyes of the state. Thus, in making the university a farmers’ university, Randhawa in fact did the reverse. Rather than change the university, Randhawa made the farmer into a university farmer. It was the farmer, not the university, who was subject to aesthetic transformation and was remade by the bureaucrat into an agriculturalist who fit into the frame of the new pedagogical project of the Indian State.
Chapter Six

Silo

In 1958, Dhunjisha Peetonji Ruttonji Cassad, then president of the Institution of Engineers, gave the presidential address at the institute’s annual session. Cassad’s broad speech tackled the question of the role of engineers in the planning process. His concluding paragraph summarized the role of famine in the post-independence imagination as well as the role of public works and infrastructure in securing the body and the body politic against the threat of starvation:

We have the glorious task of securing the country against famine, of increasing the value of its resources by improved road and rail communications, of harnessing rivers by building dams, of turning material resources into finished products, and of bringing contentment and plenty to our fellowmen. Let us work together and justify our position by our ardent desire and enthusiasm and quiet work for the welfare of the nation.¹

Embedded within this call to engineer a route out of poverty was the mathematical problem of how to modernize the economy without colonies from which to extract wealth and labor and produce markets. Nature, by supplying resources, became the only site of wealth. Earlier in his

¹ Dhunjisha Peetonji Ruttonji Cassad, “Institution of Engineers Holds Annual Session at Lucknow; Presidential Address,” *Indian Concrete Journal* 32, no. 3 (March 1958): 87.
speech, Cassad had outlined the role of engineering storage in food management because importing grains from foreign countries had produced the new problem of storage.

The Food and Agriculture Ministry of the government of India is planning construction of [barrel shell type] godowns [warehouses] for storage of 1,500,000 tons of grain. The barrel shell type has the advantages of better flexibility, better lighting, and possibility of reducing godown space required per ton of storage. Besides this, the new design is expected to save Rs. 1.8 crores on a planned expenditure of Rs. 22 crores, thus saving a colossal amount of structural steel. Having accepted this new design, the CBRO, (Central Building Research Institute) Roorkee, has started a special course for training engineers in the technique of designing it.²

From Cassad’s speech it can be gleaned that storage was a key infrastructural point in a network of distribution. This form of storage was not simply a figure of containment, like a granary, but rather a node for the distribution of a commodity. This new economy was based on managing a network that manifested the state. Storage marked the Indian State’s socialist imagination of commodities. In his speech, Cassad pointed to the kinds of innovation necessary to manage commodities in the new developmental economy. First and foremost, an economy of scarcity prompted innovation: innovate to save money, innovate to save structural steel. Secondly, innovation was to produce intellectual capital.

A Rule Bookended by Famine

British colonial rule began with famine and ended with famine. In 1771, Warren Hastings came to preside over the Bengal presidency, after Robert Clive’s term as the first Governor General of the East India Company. In 1770, the region had faced devastating food shortages and a continuing state of grievous famine-like conditions. The East India Company was beset by scandal after scandal—as Nicholas Dirks has argued, scandal was the currency of imperial pursuit. The scandals of the 1770s brought the Company to the brink of bankruptcy. Subventions from the Company to Indian nabobs led to the control of territory, but also created financial pressure to deliver returns to investors in England. This led to an accelerated

² Ibid, 87.
exploitation of the Bengali countryside, where a third of the population had been decimated by the continuing famine. In 1776, at the end of his time in office, Warren Hastings commissioned a granary from architect John Garstin, who had designed and constructed buildings such as Calcutta’s Town Hall. The Golghar was finished in 1789, after Hastings had returned to England to face an impeachment trial in the British Parliament for corruption and misconduct in his administration.

John Garstin’s granary, the Golghar or “round house,” was shaped like a heap of grain (Figures 6.1 and 6.4). It was a masonry structure around which two staircases spiraled up. Laborers were to carry sacks of wheat up one staircase, reach the top, pour the grain in through the aperture, and then descend the other staircase. At first glance, the Golghar resembles a stupa; its form recalls the Sanchi Stupa from the third century BCE. The Sanchi Stupa’s form has been a lasting signifier of Indianness in post-independence architecture. James Fergusson, writing in the late nineteenth century about architecture in India, discussed the word stupa:

“Etymologically, this is no doubt the correct designation, as Chaitya, like Stupa, means primarily a heap or a tumulus, but it also means a place of sacrifice or religious worship—an altar from Chita, a heap, an assemblage, a multitude.”

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4 James Fergusson, *History of Indian and Eastern Architecture* (Dodd, Mead & company, 1899), 50.
The stupa at Sanchi, which was only restored to its current form towards the end of the nineteenth century (Figure 6.2), found its way, in the 1930s, into Edwin Lutyens’ Viceregal Palace in Delhi as an iconographic reference. Later, its silhouette was incorporated into the entrance of the Vigyan Bhawan, a government conference hall in New Delhi (Figure 6.3). This representation marks the stark shift in resources available to the central government for iconic architectural projects in comparison to the Lutyens/Baker construction for the capital complex of New Delhi. Later, the stupa would also find its way to Charles Correa’s Vidhan Bhavan, the state government building in the city of Bhopal, the capital of Madhya Pradesh. The stupa alluded to early aesthetic innovation in the Indian context, but, more importantly, it referred to the earliest instance of India as a geographically unified territory under Asoka, the Mauryan emperor who was responsible for the spread of Buddhism after he adopted the religion in the third century BCE.

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What, then, was this stupa-like form doing in the middle of the Patna at the end of the eighteenth century? Rebecca Brown writes that it is hard to find antecedents for the form itself, since there is no evidence that John Garstin saw the stupa. However, the stupa as heap still could be a possible reference. The Golghar itself is odd: it contained a cylindrical structure that would hold the grain, so the building was largely an empty void between the outer skin and the

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cylinder. It was completed in 1789, but never filled and locked. The structure was plagued by many design flaws: the stairs were too steep and the doors opened inwards in error. These flaws were usually cited as reasons that the building had failed, but these explanations ring hollow. Was it really more expedient to abandon the project than to rectify its errors? Instead, the failure of Hastings’ Golghar was more a function of his failure to procure surplus grain for storage.

Travel writer Francis Buchanan encountered the “round house” in 1811 and described it thus:

At the western extremities of the suburbs is a building called the Golghar (roundhouse) intended as a granary and perfectly sui-generis. For the sake of the great man by whose orders this building was erected, the inscription [plaque on the side of the building] should be removed, were it not a beacon to warn governors of the necessity of studying political economy and were it not of use to mankind to know even the weakness of Mr. Hastings.8

What was this political economy that Hastings had misread, or ignored? What had caused this famine to which the province lost a third of its population through starvation? In previous decades, the East India Company had made inroads into the Indian subcontinent by buying off local rulers with privy purses and waging expensive military operations to acquire territory. This process had left the Company near financial ruin, and when Hastings was elected governor general in 1773, he was immediately in charge of the financial reform. The increasing pressure for greater and greater remittances back to England left little room for contingencies like famine, and when famine came, it devastated the population.9 These episodes mark the scandals that

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surrounded Hastings, which, as Nick Dirks has argued, were the mode of entering India. For the East India Company, scandal was method.\(^\text{10}\)

![Figure 6.4. The Golghar today.](image)

Given that famine bookended colonial rule, it is no surprise that the independent country found its legitimacy in protecting against famine. Amartya Sen and Jean Dreze have argued that the country has not suffered famine at the scale of Bengal in 1943 since then.\(^\text{11}\) However, malnutrition persists in India and is hidden by statistics that otherwise declare that food consumption is above subsistence levels.\(^\text{12}\)

**War, Development, Distribution, and a Political Economy of Crisis**

Henry Knight, a civil servant for the Governor of Bengal between the years 1939 and 1945, argued that numerous changes were made in food policy in India in the lead-up to World

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10 Dirks, *The Scandal of Empire: India and the Creation of Imperial Britain*.
War II, during the famine and in its aftermath, which were all responses to failing systems. He outlined the major failures that he argued had led to disastrous food supply conditions. His book, written in 1954, traced policy beginning in 1939, when the Indian government held a series of price control conferences, hoping to dictate a stable value to aid in their procurement of cereals for the war effort. This only succeeded in driving the grain trade underground—a process that worsened when the Midnapore cyclone hit Bengal, causing crop failure at a scale that no one was prepared for. In 1945, the government decided that price controls had failed and that the only way to bring the highly speculative grain trade under control was to take over the procurement and distribution of the commodity. In the process, they reorganized their routes of distribution, which formed the foundation of India’s Public Distribution System.\textsuperscript{13}

Knight argued that the colonial government did not have a complete understanding of the systems of food production and distribution in India at the time; thus, when supply chains were affected by war and weather distress, they were unable to manage conditions. As a result, food policy was produced in conditions of multiple crises. These new wartime food policies carried over into India after the transfer of power. Indian development theory was therefore tightly interwoven with wartime policy, from rationing to newsreel film production. The development project structured itself on the rationale of a wartime crisis.

In 1940, Dhananjaya Ramchandra Gadgil addressed the Indian Economic Conference as its president.\textsuperscript{14} In his address, Gadgil spoke of economic history in the context of questions about what pattern of economy the coming Indian state would adopt. He began by

\textsuperscript{13} Knight, \textit{Food Administration in India, 1939-47}, 198.
acknowledging that the conference was meeting under “the shadow of two great calamities”—the local one was the death of Maharaja Sri Krishnaji Wadiyar Bahadur of one of the princely states in the subcontinent, and the global one was a year of war.\textsuperscript{15} As such, the lecture addressed the question of how to think about bettering human civilization when in crisis. India was quickly hurtling towards independence—for instance, the National Planning Committee was formulated in December 1938—although the path towards it was still unclear. And so, contrary to most presidential speeches, which deal with current issues, Gadgil chose to address the future. To do this, he began in the past, with the physiocrats and Adam Smith. The question that he used to interrogate the history of liberal economic theory was: what should the relationship between public authority and economic life be? Should we take for granted that a laissez faire policy is best for the maximum welfare of all? In answering this question, he turns to the Great Depression and Keynesian policies of infrastructure spending. Here Gadgil waded into familiar territory in key debates about liberal thought—or what Mark Blyth calls the “can’t live with it, can’t live without it” schizophrenia of the relationship to public authority.\textsuperscript{16}

Gadgil argued that the universalism implicit in the analytical methodology of classical liberal economic thought was contravened by the existence of India. The existence of a colony that was in no way a laissez faire space in the British market contradicted classical liberal theory. For instance, in India, unemployment had been chronic rather than cyclical, which is to say that it was not in keeping with the laws of classical economics. The crucial question was: how do we

\textsuperscript{15} Ibid., 1.
\textsuperscript{16} Mark Blyth, \textit{Austerity: The History of a Dangerous Idea} (Oxford University Press, 2015), 106.
transition from the colonial economy to a liberal one? Is public authority necessary (can’t live without it) because we must make this transition?"\(^{17}\)

Gadgil proposed that the state’s central charge should be to provide relief for the distress caused by the insecurity of an economy in transition. Relief was a key word, as he went on to explain: “in India the only measure of this character adopted has been the opening of famine relief works by government at times of widespread failure of crops. … I am personally led to think that the best way of meeting the problem is to follow the same methods as those devised by the famine relief administration. Instead of framing programmes of relief works which are resorted to only occasionally there should be continuous schemes of annual public works which would afford the necessary employment and relief.”\(^{18}\) Public works, which have come to mean government-led projects for the distribution of money to people in poverty, continue to remain at the center of Indian pro-poor policy. In 2013, a World Bank report assessed India’s national rural employment guarantee scheme (NREGS) to be the largest public works social safety net in the world, reaching 182 million beneficiaries. Under the NREGA scheme, the state employs people in manual labor to construct roads, buildings, and other forms of infrastructure.\(^{19}\)

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\(^{17}\) Gadgil, “Presidential Address to the Twenty-Fourth Session of the Indian Economic Conference, Mysore, 28th December 1940,” 15.

\(^{18}\) Ibid, 17-18.

\(^{19}\) The African public works experience is mirrored on the Asian continent. Since 2006, the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) has delivered the largest public works program in human history. The program provides 100 days of employment upon demand in rural India, for men and women alike. MGNREGS is currently available to almost 56 million households, making it the largest safety net scheme in the world. Rodriguez Alas et al., “Public Works as a Safety Net: Design, Evidence, and Implementation” (The World Bank, November 20, 2012), 1, http://documents.worldbank.org/curated/en/289871468339050938/Public-works-as-a-safety-net-design-evidence-and-implementation.
In another essay, “Wartime Controls and Peacetime Ends” (1947), Gadgil proposed a future for the legacy of procurement and distribution. He wrote: “at the end of [World War II] India had almost the same apparatus of controls as in other countries. We had a detailed system of rationing of food and perhaps a larger drive towards procurement of surplus grain supplies than in most countries in the world.” Drawing a parallel between a state at war and a developing nation, both of which were strapped for resources, he posited that national planning “will find it necessary to utilize for peacetime ends our existing equipment of regulatory devices which is the legacy of wartime controls.” Gadgil’s essay resolved on the use of wartime machinery for national planning by asserting that it was the only way to raise the standard of living of workers and peasants. Gadgil’s idea of an economy-in-crisis as national policy was reiterated in his wartime essay. Capitalism itself continually generates crises that allow for forms of accumulation. To counter this tendency for capital to move upward during crisis, Gadgil argued that development could provide the structural conditions for wealth to be transferred downwards during those conditions of crisis.

Thus the political economy of public works is a political economy of crisis: the state is given authority to reorganize resources to remedy conditions of distress which have been caused by external circumstances that have distorted the markets on which liberal economic models rely. The Indian developmental economy was structurally connected to the war economy.

**Buffer stock and the state as a benevolent hoarder**

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20 This work followed from his detailed analysis of colonial wartime economic policy, installed during World War II. Dhananjaya Ramchandra Gadgil and N. V. Sovani, *War and Indian Economic Policy* (Gokhale Institute of Politics and Economics, Poona: D. R. Gadgil for the, 1943), 27.


22 This inheritance from the war years needs therefore to be looked at from the point of view of the use it can be put to during the forthcoming period of reconstruction. Gadgil, “Wartime Controls and Peacetime Ends.”
The key idea that emerged from these deliberations was that of buffer stock. Buffer stock was a reserve of grain held by the government to guarantee that it would have the capability to intervene in any shortage-related crisis. Buffer stock acted to secure the Indian body from famine. Put another way, the state was determined to become a hoarder—albeit a benevolent one. In its command of territory and policy, the government could out-hoard all other middlemen, and thus secure the body and its own legitimacy. To do this, the state needed silos. Storage, as it turned out, was a key political technology with which to manage the economy of consumption.

Early attempts to create this buffer stock failed, as the indigent country struggled to meet production targets and supplemented shortages with American grain. In contrast to India’s difficulties, in the postwar years the United States faced gluts in its agricultural sector that bankrupted many American farmers. During the Cold War, the Eisenhower administration repackaged US surplus grain as foreign aid through Public Law 480. This Food for Peace program doubled as a tool of diplomacy in the American Cold War arsenal, enabling the US to influence the Third World against the Second. Thus, in the 1950s, India began receiving large shipments of wheat, living “ship-to-mouth” as it struggled to bolster its grain production.


India received food aid from the US in varying amounts between the years 1947 and 1971 via changing administrative mechanisms. This food aid was processed through a number of different legislative mechanisms. First, it was managed on a piecemeal basis. In 1949, Nehru visited the US and, during the diplomatic trip, toured a farm in the Midwest, near Chicago. Here, he was taken to see corn storage systems designed by Butler (Figure 6.5). These metal bins were
hardly iconic as compared to Mendelsohn’s images of grain elevators, but they had been key in managing overproduction during the Depression.

Figure 6.5. Jawaharlal Nehru, Prime Minister of India, paid a visit to farms in the Midwest near Chicago on October 28, 1949, during his visit to the city. Beside him is the huge metal drum used for the storage of corn.

In 1951, grain was secured between Nehru and Truman on “special and easy terms” when two million tons of grain were allocated to India. This was done via the India Emergency Food Assistance Act, which was most memorably imaged in the photo of Vijayalakshmi Pandit, then Indian Ambassador to the US, standing and watching grain being poured into a ship headed for India. Pandit visited Philadelphia and stood on the bridge of the Liberty Ship, named John Chester Kendall, at Girard Point. From here, she gave a speech in which she “thanked Americans for an emergency grain shipment to her famine-ridden country today as the last of 9,300 tons of wheat were being loaded in this port.” Loy Henderson, the US ambassador to India, called the wheat “a symbol of goodwill of the American people” (Figure 6).

Only in 1954, when the US Agricultural Trade and Development Assistance Act was passed, did regular exports of wheat to India begin. India signed the first Public Law 480 (PL480, as it was publicly known) agreement when the Eisenhower Administration was in power, and this contract between the countries shifted to a new form of dependence that lasted until the 1960s. The key legislative mechanism that PL480 brought into action was that surplus agricultural commodities could be sold to India in “foreign currency,” which would then be reinvested into India for developmental purposes. This law gave a fillip to organizations like the
Rockefeller Foundation and the Ford Foundation, which could channel experts into India who would be paid by the US government in Rupees, as was mandated by law.

However, opinion about whether sending food grain supplies to India was in the country’s best interest was not unanimous. A short memo by Alan Gregg, entitled “Precarious Welfare” and passed around the Rockefeller Foundation, claimed that, by Malthusian metrics, any assistance on the food front would only exacerbate the larger problem facing India and the world. Gregg’s memo did not make any proposal or even reference any condition in India. Rather he simply provided an analogy through a story of an island whose deer population was thrown out of balance by either pestilence or abundance.\textsuperscript{25} Although this memo remained internal to the foundation and its Malthusian implications didn’t appear in any policy-related decision making, its contentions remained at the core of the foundation’s work in India and in the developing world in general. For the Rockefeller Foundation, providing technical assistance was in all ways preferable to providing food aid. It was an institutional-level manifestation of the “give a man a fish” argument that pervaded the developmental episteme.

Walter Lippmann, then the ambassador from the US to India, wrote an essay in the *Herald Tribune* entitled, “Today and Tomorrow, Famine and Diplomacy.” The article outlined a set of circumstances that had coincided in 1951: India’s application for food aid, the disagreement between India and the US on China, and the crisis of disagreement in the United Nations.\textsuperscript{26} Lippmann’s essay examined the complicated ways in which politics, bureaucracy, and diplomacy intersect, and the ways in which relationships between countries are built. He asserted that the US did not necessarily intend to use food aid as a diplomatic bargaining and that it was

\textsuperscript{25} Alan Gregg, “Memo: Precarious Welfare,” December 10, 1951, Box 1 Folder 1, RF 1.2 Series 460, Rockefeller Archive Center, New York.

possible that the timing was coincidence, but should it not have been, he took strong umbrage at the decision for the State Department to consider India’s food aid application while the US - China crisis was unfolding in the UN. He argued that the coincidental timing of the two events read as a threat to India that there might be a connection between the country’s foreign policy decisions and its ability to receive American food aid.

Walter Lippmann’s newspaper article was clipped and added to documents in which decision makers at the Rockefeller Foundation debated whether the Foundation should enter India, and if so, what kind of presence it would have. This debate was read differently on either side of the globe. Any bureaucratic or other delays on the part of the US were read as condemnations of India’s politics if they didn’t align with US politics in that moment.

Truman’s technical co-operation program (TCM) was continued and combined with Eisenhower’s PL480 donations. France had a similar arrangement with India. When India needed to buy 50,000 tons of fertilizer valued at US $2 million, the Indian government paid for it in Rupees into the local fund and the foreign government then matched that amount in foreign-exchange. India continually looked for countries with which it could barter commodities, thus circumventing the use of foreign exchange.27 At one point it exchanged jute for rice with Brazil.

PL480 stands in contrast to the Truman Doctrine and Marshall plan of the United States which attempted to reindustrialize Europe in the context of the Cold War.28 Coming out of the same geopolitical difficulties, PL 480 attempted to smooth tensions in the Third World through

27 The TOI reported that efforts were being made to trade with European countries on a barter basis.
28 This is to say that aid coming from the International Development did not act as a demand generating device, even when it was tied to the technical cooperation mission projects and to the public works that accompanied them. Arindam Dutta, “‘Strangers within the Gate’ Public Works and Industrial Art Reform,” Colonial Modernities. Building, Dwelling and Architecture in British India and Ceylon, Edited by Peter Scrivener and Vikramaditya Prakash, 2007, 107.
food aid: for “Food for Peace,” read food against communism. The donations of wheat to India in 1955 dovetailed into the ongoing Indo-US Technical Cooperation Program, which sent agricultural experts, machinery, lab equipment, pesticides like DDT, and some amount of foreign exchange for use by the developing country.29

Storing Imports

In 1952, as US shipments of wheat to India were regularized, the debate at the Ministry of Food and Agriculture regarding storage intensified. The ministry’s storage division was struggling to produce space to store the large quantities of wheat it had begun receiving from foreign governments. First, the Storage Department attempted to quickly construct godowns at the ports; Calcutta in particular was the subject of some discussion. K. R. Sontakay, the Officer on Special Duty (OSD) storage, wrote that silo storage at ports seemed to be the most economical option: it would allow officials to manage the humidity of port towns and circumvent the process of bagging and unbagging at the time of arrival.30 At that time, Moti Lal of the Finance Department wrote to the Food Department about the money being allocated to storage. He asked if this storage was necessary at all, given that decontrol and the restriction of rationing might change the pressure on the states to store grain. Moti Lal was concerned that money was being spent on infrastructure without much knowledge about its usefulness:

We have no accurate standard to judge the reasonableness or otherwise of the proposed expenditure but prima facie an expenditure of Rs. 80/- per ton on the construction of an ideal storage godown in the Port Area at Calcutta constructed to last for at least 30 years, does not

29 The technical co-operation program was announced by Truman in 1949 and was continued by the Eisenhower Government which attached it to PL480 donations. France had a similar system – for example – when India needed to buy 50,000 tons of fertilizer valued at US$ 2 million, the Indian government paid for it in Rupees into the local American fund, and the foreign government then matched that amount in for-ex (the TOI reported that efforts were being made to trade with European countries on a barter basis.)) devkinandan???

30 Inquiry about the construction of New Godowns in the Jinjirapul Area, Calcutta, 22.12.52 File No. SG-1803/40-vol.VIII/53, Department of Storage, Ministry of Food and Agriculture,
appear to be disproportionately high. Much will, however, depend on the ultimate life of the structure and the subsequent expenditure which we may be called upon to incur on it from time to time after the first construction or after the first approval of the estimate. We have no idea how many revised estimates and completion reports will be necessary."

Storage construction was taking place in conditions of uncertainty. At no point was it clear what direction the market was going to head in or where infrastructure needed to go to efficiently manage the market. As a result, over the next decade, a detailed and granular bureaucracy was developed with which to estimate and determine prices.

Simultaneously, in this condition of incomplete knowledge, there was a desire for models—for an ideal project that could set the standards for future projects. The development of standards was the key issue, and it resurfaced in the 1955 discussion of storage godowns in Mokammeh, Bihar. C. A. Ramakrishnan, the Director General of Food, wrote up the estimates from the project, noting that the specifications for these storage units followed those in Bengal, which were designed in consultation with the Food and Agriculture Organization expert Mr. Harrison:

In addition to the sheds and the essential external supply mains, electrification of premises etc., provision has also been made for ancillary structures like raised covered platforms, buildings for office and stores, quarters for chowkidars, lavatories books, sentry boxes in all places and for canteens and electric sub-stations where necessary. All the structures are necessary adjuncts for the proper functioning of any storage organization in this country and may be treated as standards for the future.

If one key factor was the creation of standards for future projects, another was the reliance on the idea of expertise—“our experts consulted their experts.” Of course, if the Indian officials were able to consult their experts...

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31 File No. SG-1803/40-vol.VIII/53 - 16.7.52
32 As with Frederick Hayek’s argument, the market is the only institution that knows price, and its granular understanding of price allows it to know fluctuations better than any state apparatus.
33 Construction of godowns - Mokameh Bihar, Estimates for. 1955. File F25(6)/55-SGIII, Department of Storage, Ministry of Food and Agriculture, National Archives of India.
experts on the matter, why would they need to consult with the American experts? This points to the formulation of expertise as a condition of wielding authority rather than knowledge.\textsuperscript{34}

In August 1953, when wheat prices in Chicago began to fall, India was put in a strangely precarious position. Rafi Ahmed Kidwai, the Minister of Food and Agriculture, had signed the International Wheat Agreement in May, which stated the floor prices at which India was mandated to purchase wheat. The predicament explains the relationship between state and market quite clearly. When making agreements, usually at the beginning of the season, experts would determine the price below which a commodity could not fall without doing irreparable harm to the farmers selling it. This was the “floor price,” and governments were committed to buy any and all wheat at that price to protect farmers from conditions of excess production. On the flip side, there was a ceiling price—the maximum price the government would pay for any stock. In 1953, the Indian government was doing quite well on procurement operations, with a ceiling price of $2.05 per bushel on wheat. When prices in Chicago began to drop from $2 to $1.70 per bushel, the worry was that they might hit $1.55, at which price the Indian government would be obligated to pick up American stock. The difficulty with being forced to purchase large stocks of cheap grain was that the government did not have the requisite storage:

With limited storage capacity available in the country, the commitment to buy a further million tons when the floor price is reached will prove a problem of some magnitude in itself, quite apart from the deflationary pressure it will exert on our internal economy.\textsuperscript{35}

This article speaks to the friction encountered in treating wheat as both an economic object and a physical commodity: each form had the capacity to destabilize the other. As things stood, the

\textsuperscript{34} Timothy Mitchell has argued that expertise is not something experts bring to the table, but rather something they develop in their interactions with the proverbial table. In this sense, expertise is situated knowledge, but situated knowledge that conceals its situated nature in order to wield authority.

\textsuperscript{35} S. Mulgaokar, “India May Be Forced To Lift. Million Tons Of Wheat,” \textit{The Times of India}, August 23, 1953.
situation that Mulgaokar wrote about was unlikely, given that the US government had multiple price supports in place to prevent a further drop in the price of wheat.

In 1954, Kidwai died with, as the Press Information Bureau reported, the “improvement in the country’s food situation ... almost the last words on his lips.”  

At that time, an Indo-US joint project was signed that included an agreement to provide storage facilities of all different types, sizes, and temporalities, along with training in these new techniques for Indian officers in the US. The agreement put together dollars for expenses incurred abroad with rupees for expenses within the country.

The agreement between the two governments included not just funding for storage construction, but storage facilities themselves. Through their Technical Cooperation Mission, the US gave India a number of prefabricated storage structures, two of which were iconic silos made of galvanized steel. Thus, in 1955, fourteen ships arrived at Indian ports carrying a disassembled gift from the US government: small, two meter by two meter, durable, lightweight sheets of galvanized steel—a kit of parts to be bolted together into two ten-thousand-ton capacity silos to be installed on poured concrete foundations anywhere in India. (All sites were fungible for the silos).

In the early twentieth century, the United States vastly overproduced grain. Industrial agricultural methods had rendered the land fertile to the point of glut. Throughout the Great Depression in the 1930s, prices plunged and wheat rotted in fields because it cost more to move the commodity than the wheat could fetch at the market. In 1938, in an attempt to alleviate the

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37 File FIN-1954-06-14_1796. Press Information Bureau, GOI.
volatility caused by overproduction, the government contracted with Butler Manufacturing of Kansas to produce large steel grain silos that could absorb wheat surpluses, temporarily removing them from the market and stabilizing prices.

As Butler realized, stabilizing grain prices involved stabilizing steel: they developed new methods of galvanization to ensure both the commodity and the container would last. Butler’s steel sheets are iconic in architectural modernism through the work of Buckminster Fuller who used them to design shelters for soldiers abroad that would easily be assembled and disassembled—although, because steel was scarce in wartime, Fuller’s houses were never put to use (Figure 6.7).

![Copyrighted Image](image)

Figure 6.7. Fuller’s house in collaboration with Butler Manufacturing. 1940.

This was the typology that was exported to India. In India, the Storage Department began a process of site selection and land acquisition. In the same vein of uncertainty, it was unclear who had the expertise to put up the silos. Letters going back and forth between the ministries of Food, Finance, and the Public Works Department discussed the specifications for various aspects of the project to assemble and erect the American silos. The project involved not only silos, but also the construction of godowns, adjunct structures, infrastructure such as

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electricity and water supply for the whole site, and railway sidings to connect the site to the rail network.

The Ministry made the decision to erect the first silo in the wheat-market town of Hapur in the state of Uttar Pradesh, close to the capital city of New Delhi. At that point, the plan was to erect the second silo in Ludhiana, arguably the center of food production in the sense that it commanded capital around agriculture. It is unclear why Ludhiana was abandoned as an option for the second silo—some reports indicated that they could not find a site with enough of a bearing capacity. Others suggested that wind loads were too high. It is possible, however, that land around Ludhiana was too valuable to be acquired for this type of project. Instead, without much fanfare, the second silo was constructed in the ports of Calcutta at Kidderpore/Khidirpur. No mention of the project was made in the national archives, but some photos do show the silo, with its iconic bolted galvanized steel panels, in the background. The silo has since been dismantled, and new projects are coming up on the site.

The Hapur project occupied a significant amount of the attention of the Ministry, and over a period of five years the storage department acquired land, contracted works, and constructed the structure. Yet, a surprising passage appears in the archive for 1957. The Regional Director of Food had conducted some investigations on food stock in Hapur over the previous three years and had recommended that storage now be limited to 20,000 tons.  

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39 The Regional Director of Food New Delhi has made certain suggestions for storage construction at Hapur and Delhi. He sent Additional Director to Hapur to investigate food grains at Hapur and also the stocks that were held there for the last three years. On the basis of this, he has recommended that we need not have storage capacity of more than 20,000 tons including 10,000 tons capacity of the silo cum elevator for Hapur. According to him the average of arrivals for the last three years works out to 9144 tons per year and the quantity stored in the godowns from this wheat is 3,262 tons.
He has further emphasized that Hapur has lost its importance as a grain market and is not more important as a Gur market although the price trend at Hapur has influence on the price structure of wheat in other parts of the state.

So now, after years of planning the site, acquiring the land, designing, and construction, it turned out that Hapur was, in fact, not relevant as a location for infrastructure. What now? The market, it turned out, had no qualms in leaving buildings obsolescent. Obsolescence, as such, is born from the capacity of markets to disaggregate capital from the physical world. Capital can move easily, leaving behind it a trail of now-obsolescent architecture. In some sense, by tracking obsolescent architecture, we can track the shift in economies.

Amriki Mela: Inaugurating US Help

On March 21, 1959, V.V. Giri, Governor of Uttar Pradesh, inaugurated the grain silo-cum-elevator in Hapur, the first of its kind in the country. The 27 lakh rupee plant was a gift from the United States’ Technical Cooperation Mission, and was “equipped with the most modern mechanism for loading, unloading, weighing, cleaning and disinfecting foodgrains” (Figure 6.8). It had a storage capacity of ten thousand tons and was meant to be part of the apparatus of infrastructure and institutions that would attack the “vital problem” of food shortages facing the country—a problem that Union Food minister A.P. Jain had, at the same function, stated was largely one of the storage of food. The government, he added, intended to provide facilities here for storing at least one hundred thousand tons of grain so that any emergency arising in any part of North India could be met immediately. Speaking at the same occasion, the US Ambassador, Ellsworth Bunker, described the elevator as a “symbol of co-operation” between India and the US. 40 Hinted at in these brief articulations is the difference between the motivations of the two governments. While, for the Americans, the silo represented

40 “Rs. 27-Lakh Grain Silo & Elevator Opened In Hapur,” The Times of India; New Delhi, India, March 22, 1959.
India’s commitment to liberal capitalism, for the Indians, storage architecture spoke to an ongoing obsession with buffer stock (Figure 6.9).

Figure 6.8. “Equipped with the most modern mechanism for loading, unloading, weighing, cleaning and disinfecting foodgrains” at the silo-cum-elevator, Hapur.

Figure 6.9. Views of the galvanized steel silo at Hapur, New Delhi. April 1960. Photo Division, Ministry of Information and Broadcasting, GOI.
The silo at the Hapur became an iconic figure for Indian storage, appearing repeatedly on journal covers and in publicity material. It continues to be functional today (Figure 6.10, 6.11).

Figure 6.10. The silo at Hapur today.

Figure 6.11. Cover of the Food Corporation of India’s Annual Report, 1974-75. The image brings together the silo and the bullock cart as symbols of modernity and tradition spliced together.
In April of 1959, while the silo was under construction in Uttar Pradesh, the US-Soviet opposition played out in a different arena. The US Department of Commerce commissioned Minoru Yamasaki to design and build a temporary structure of indeterminate size in a foreign country. Upon receiving more specific instructions—the building was to be an agricultural exhibit and the foreign country was India—Yamasaki agreed and was given seven and a half months to complete the project in time for the December event of India’s first World Agriculture Fair. The Fair, to be held in Delhi, coincided with President Eisenhower’s visit to the country. Its pedagogical and promotional displays would exhibit the latest American industrial farming equipment and technology in the hope of inspiring Indian agriculture, but Yamasaki made it clear that the brief of the design project was to preempt and eclipse a grand Soviet pavilion. In fact, America had only entered the fair upon hearing of Russia’s participation.41

Besides outdoing an imagined Russian counterpart, the design brief required Yamasaki’s exhibition to embody an odd paradox. It was to set up a clear sequence of technological evolution—“United States agriculture of 50 years ago was at about the same stage of development as India's in 1959”—and a corresponding route that would convince the viewer of this argument. Paradoxically, the exhibit was to embody a democratic experience as opposed to the regimented methods of the Soviets; so it was supposed to lead to regimented conclusion, but seem unregimented. Yamasaki excelled at this. Instead of constructing a continuous pathway, he broke the exhibition up into four zones that were to be entered one after another (Figure 6.13, 6.14). These zones were punctuated at two points with amoeboid ponds upon which geometrically laid out, domed modules contained visitors who nonetheless entered into an expanse of the ground. The middle zone was left without a clear path. Instead, it was punctuated

by silk tents, a merry-go-round, and a Ferris wheel—objects that laid claim to American ways of life. In the background was a barn; ironically Yamasaki said it was his first and last American barn—he only designed one as a sign of America, never in his work in the country itself (Figure 6.15).

This atmosphere of gaiety led you into a room of machines that Yamasaki himself described as out of place, too advanced to be of use to Indians (Figure 15). The exhibition itself, designed to display technological progress, was built by hand, with mechanical drills and saws. Eisenhower’s visit and inauguration of the *Amriki Mela* (American Fair) sutured the simulacrum of “democratic space,” with the president riding both the Ferris wheel and the merry-go-round, to the amusement of the public, to demonstrate America’s “people oriented approach.” But the main purpose of the visit was to pledge to India six million tons of wheat, which India was eager to use to bolster its wheat reserve so that it could stabilize prices.

![Copyrighted Image](image)

Figure 6.12. Minoru Yamasaki’s golden domes look like piles of wheat stretching into the distance.
Figure 6.13. The plan for Minoru Yamasaki’s American Pavilion for India’s first World Agriculture Fair.

Figure 6.14. Aerial view of the Amriki Mela, the American pavilion at the World Agriculture Fair, New Delhi. April 1960. Photo Division, Ministry of Information and Broadcasting, GOI.
While the tools of price controls are abstract, their guarantee—a wheat reserve, a buffer stock—is a real and concrete thing. The physical, volumetric, corporeal, and perishable nature of the grain was bound to complicate the grand designs of its theoretical doppelganger. After all, where do you store so much wheat? The scale of the logistical problem was made clear by a Times of India news report that stated that, in total, India had only 1.7 million tons of storage divided among 110 centers across the country. The spatial extent of the operation was also not lost on the reporter. “The ports which handle imported grains are Bombay, Calcutta, Madras, Cochin and Kandla. About 800 railways wagons carry nearly 17,000 tons of food grains [which] are loaded daily from these ports to the interior.” In total, the Ministry of Food and Agriculture planned to have 972,000 tons of concrete silos and warehouse storage ready for use in 1962. This storage was to be completely Indian-owned, located mostly at ports, and stocked with American surplus grain.42

42 “It is stated that in view of the agreement with America the godown capacity will have to be more than doubled in the near future . . . As part of the government’s big food storage program, silos for the bulk storage of food grains, mainly wheat, are being built at Kalyani, near Calcutta, and Borivli, near Bombay. The silos to be constructed in concrete will be in addition to the 10,000 ton steel grain elevator already in operation at Hapur, near Delhi, and a similar one under construction at Calcutta port. The Hapur silo was built with assistance from the TCM. The new silos in West Bengal and Bombay will be much larger and will be completely Indian owned.” The article also stated “Besides dealing with the storage and distribution of grains, the Food Department is also engaged in changing the pattern of food consumption. A technical division of the department is interested in reducing the people’s habit on the dependence on cereals. Efforts are also being made to develop and popularize certain processed food products.” What is meant by “reducing people’s habit on the dependence of cereals” cannot be known, but is certainly absurd.
“GRAINS STORAGE AND DISTRIBUTION: Brisk Arrangements By Food Department,” The Times of India; New Delhi, India, May 27, 1960, 7.
Self-Sufficiency as Ideology

In 1956, the Food Minister A. P. Jain declared, in a speech in the Rajya Sabha,

I announce here, with confidence that today we are in a position, both on the basis of stocks we have in our godowns and arrangements for imports which we have made, to meet any contingency that may arise in this country not only during the current year but in the future as well.43

The speech marked a general air of comfort with the food situation in the country at the time. Jain reminded his audience that, although he understood their anxiety at the food situation, he did not share their alarm. He agreed with them that the “real solution” to the “food situation” was to increase production, yet he took another stand. “I am not a believer in the doctrine of autarchy that every country should be self-sufficient in everything, but taking agriculture products as a whole, I think, we should by and large be self-sufficient in our main requirements.”44

In 1952, Indubhusan Chatterjee had argued against autarchy in food production in a pamphlet, "Is our country really deficit in Food?: a Factual Analysis.” Chatterjee contended that if you considered the geography of food grain production in relation to partition and loss of supply, it would be obvious that there was no sudden deficit in production or growth in population that had rendered the polity deficit. Rather, the territory that currently constituted “India” had always acquired food from other places. Thus, argued Chatterjee, self-sufficiency may not necessarily have been the correct goal in this regard.45

Both Jain and Chatterjee eventually concluded in agreement with the general consensus that India should be self-sufficient in food. At this point, the idea of being independent in terms

43 Confidence in food, Minister’s Statement in the Rajya Sabha. File. FOO-1956-08-30, Press Information Bureau, GOI.
44 Ibid.
45 Indubhusan Chatterjee, “Is Our Country Really Deficit in Food?: A Factual Analysis of India’s Serious Food Situation” (Calcutta, 1951).
of food production became ideologically rooted in the country’s pride. Calls for “food security,” where the terminology of defense is borrowed for food production, reflects this. It is also embedded in the pride associated with India’s food exports after the Green Revolution, usually referred to with the phrase, “from ship to mouth to shipping out.” Overproduction, which had caused significant turmoil to countries in those conditions, was still seen as the goal for the developing world. This would become the thrust for the World Bank in the 1960s.

In conclusion, the first three planning periods of the Indian state saw and increasing fixation on buffer-stock as a means to secure the state and its body politic from famine like conditions. This drive for a buffer led the state to reconfigure its idea of self sufficiency as a political process of empowering its people to an ideological understanding in which the nation was self sufficient in a quantitative way. For instance, a well-fed farmer and a malnourished one cancelled each other out because statistically, there had been enough food between the two of them. This perverse calculus encapsulates the quantitative logic of the now “self-sufficient” state.
Chapter Seven

System

It is not as if the Food Minister at the Centre or in the State is King Canute to order the tides to recede or to advance.

-Chidambaram Subramaniam, Minister of Food and Agriculture, Food Debates in the Rajya Sabha, Concluding Speech, December 9, 1965.

How did the Food Corporation of India (FCI) come into being, and how did it see itself as a player in the food security conundrum? This chapter addresses the different ways in which the FCI attempted to fashion itself as both a market player and a state agency, I examine how the FCI tried to play this double role, morphing between these two forms as needed in order to manage economic instability (as a state agency) and buy and sell wheat (as a market actor). This chapter argues that to function in this Janus-faced way, the FCI needed certain forms of infrastructure which were key in making this happen. To be sure, the FCI is not an institution that developed in a vacuum. It developed as a response to very particular historical developments in the two decades preceding its conception in 1964. There is a key agent in this chapter that structures the nature of the institutions that come into play around it: the commodity of wheat.
I examine how the FCI used infrastructure and networks to come to terms with wheat as a modern commodity. In order to do this, I look at one major project that had very similar goals to those the FCI would later claim to achieve at a much larger scale. I use this example to see how the state functioned in the pre-FCI, pre-Chidambaram Subramaniam moment.

I contend that the FCI, as an institution, attempted to change the political and economic geography of grain. By acting in the name of the state and the market, the FCI intervened in infrastructure and decision making at the scale of the state. In this case, infrastructure becomes a key marker of the bones of the system.

An Unexpected Turn

On May 27, 1964, when Jawaharlal Nehru, India’s first Prime Minister, died after seventeen years in office, his successor, Lal Bahadur Shastri, inherited the country’s dire agricultural situation. In the years since independence in 1947, India had failed to achieve self-sufficiency in food grain production. Its agricultural sector remained mired in low productivity and land reform remained an uneven, and largely failed, process. The government had been left with little choice other than importing the deficit amount of food grain to prevent speculative price rises and famine-like conditions from taking hold. This proposition itself was not ideal given the country’s negative balance of payments, which meant that it didn’t hold the required amount of foreign exchange to make purchases of basic commodities like wheat. The government had found itself dependent on grain from several foreign governments willing to accept payment in non-dollar currencies. Large among these were the United States; the Eisenhower administration had signed Public Law 480, which involved shipping large quantities of wheat, both subsidized and donated, to India. This arrangement, which at India’s worst point supplied one ship per day, led to the phrase that India was living “ship to mouth.”
Over the two decades since independence, Nehru’s government had put into action several different programs to bolster agricultural production. These programs were overseen at different levels. Some, like research programs, were overseen by the central government; others, like university development, by the state governments; others still, like the Intensive Agricultural Development Program, by external agencies like the Ford and Rockefeller Foundations. However, these programs had had little effect in increasing the amount of food production at the all-India level, and conditions continued to worsen.

In the wake of Nehru’s unexpected death, his successor, Prime Minister Lal Bahadur Shastri, invited Chidambaram Subramaniam to helm the Ministry of Food and Agriculture in his cabinet. Subramaniam, who then held the Steel and Heavy Industries portfolio, agreed to switch to agriculture on the condition that he be allowed a free hand to restructure the central government’s policies. The minister later reflected on this invitation as one that all his colleagues warned him against accepting. Given the dire situation, this cabinet position was most likely a losing political gamble. In an autobiographical account of his agricultural policy, *The New Strategy*, he reported what Prime Minister Shastri said to him: “No other senior minister is prepared to take the portfolio because it has been the Waterloo of many former ministers.” Fashioning himself as the hero, Subramaniam continues: “He thought it was a challenging job and that I should take it over. Put that way I could not refuse” (Figure 7.1).46

This chapter addresses the shifts in policy that Chidambaram Subramaniam brought about as Minister of Agriculture. A central argument is that the Food Corporation was expected to function in many paradoxical ways to compensate for the political economy of grain. It was designed to have a vast swathe of discretionary powers to counteract the political stalemates between the center and state governments in India. The chapter draws a link between the economic policy of “buffer stock procurement” and the infrastructural mandate to build silos and warehouses. It concludes that these early schemes to rationalize grain movement across the territory of the country primed the countryside for neoliberal capital.

Subramaniam’s Proposal

Upon taking his position, Subramaniam faced several challenges, some immediate, others more long term. What would give farmers immediate relief from rising prices? How could the state governments’ resistance to central policy be managed, and how the sector be reformed over the long term? To identify the problems, Subramaniam formulated the Jha Committee,
headed by L. K. Jha, to investigate ways forward for the sector. The committee—whose prescriptions coincided with the Minister’s technological imaginary of industrializing the sector—recommended price supports, price controls, trading, and rationing, but only in the short term. It was generally agreed that, in the long term, only production increases would resolve issues of price and scarcity. Immediately, the Jha Committee decided to increase the procurement price by 15% to address the price rises facing the market. Yet this was an ad hoc measure that did not intervene in the larger problem at hand.47

A significant difficulty was the question of how to unite state and central governments towards the same goals, given that agricultural policy belonged to the state governments and it was in their jurisdiction to implement plans evolved at the central level. (This was the problem that Nehru famously struggled with.) Subramaniam knew that state governments depended on central grants to carry out developmental activities: “we used this financial mechanism to bring indirect pressure on the states. If they agreed to follow a certain programme, they received a grant. If not, they had to manage from their own resources.”48 But this structure of control was delicate, and he also understood that the federal hand could not be overplayed. The question was how to get state governments to acquire grain at low prices for a central reserve.

Later that year, Subramaniam proposed what would become his real victory: a food grains trading corporation that would manage all the ad hoc measures and reformulate them as a combined set of instruments with which to address the agricultural problems facing the sector. Subramaniam held a conference in June of 1964 to propose the idea of the corporation to the Chief Ministers in order to bring states governments on board with central efforts. The resulting

48 Subramaniam, The New Strategy in Indian Agriculture, 3.
“Note for the Cabinet” was circulated as a proposal for setting up a Foodgrains Corporation in India. The note, written by a team of people from the Planning Commission and the Ministry of Agriculture that included the Minister himself, outlined the broad scope of this new institution. Why this broad scope? What problems was the institution attempting to solve? There were two large goals for this new organization. The first was to set up an agency that would determine prices at the all-India level so that they were “fair and economical to the producer, and for fixing suitably the reasonable wholesaler’s and retailer’s margins and the consumer prices.” The second task was to set up the organization which would secure a “commanding position in foodgrain trade across the country.”

The first of these goals involved creating another organization, also recommended by the Jha Committee: the Agricultural Prices Commission (APC), which was to meet twice a year, assess the overall situation in grains, and determine floor and ceiling prices with which the government would approach the market. The second goal involved the creation of the FCI, a body that would manage certain essential commodities, such as wheat and rice, between the farm, where they were produced, and the ration shop, where they were finally sold. Because of this grand scale at which the logistics were meant to function:

It [was] proposed that the foodgrains corporation of India should be set up as a statutory Corporation wholly owned by the government. For the present, it is proposed to confine its shared to the central government. Bearing in mind several large spheres in which it may ultimately have to operate, it is felt that instead of setting it up as a company incorporated under the companies act, it would be preferable to set it up right from the beginning as a statutory company.

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49 Chidambaram Subramaniam and Planning Commission of India, “Note for the Cabinet: Proposal for Setting up a Foodgrains Corporation of India,” June 1964, 1, File No. 37/6/CF-64. Ministry of Food and Agriculture, National Archives of India.
50 Ibid., 4–5. A statutory corporation refers to a special body created by an act of parliament, as opposed to a company with shareholders.
The proposal declared that the “primary functions of the corporation of India would be the purchase, storage, movement, distribution, and sale of foodstuffs” with the “ultimate objective of securing a commanding position in the foodgrains trade.” The all-encompassing nature of the proposed institution was apparent, but even though the corporation would consolidate logistical matters, it did not introduce any new instruments of control. Apart from discretionary powers, all the tools of the corporation were continuations of the regulations that the Ministry of Food and Agriculture had put in place earlier. Buffer stock had always been a priority, fixed prices for the sector had always been in place, and wheat zones were in effect to manage price differences between surplus states and deficit states. In fact, these policies had evolved from rationing and control policies developed by the colonial government during World War II.51

But it was precisely the discretionary powers that made this corporation a new governmental form. In expanding the scope of its older instruments of buffer stock, restricted movement, fixed prices, and so on, Subramaniam was arguing that previous efforts had failed because they had been limited in their capacity to carry out their goals.

Procurement and internal distribution at approved prices and the building up of our buffer stocks have been an essential feature of our food policy for some years now. Such procurement has been done in a somewhat restricted manner by Central or State Government departments.52

The FCI would be able to exert spatial and temporal control over foodstuffs by its sheer size. The discretionary powers gave the state’s governmental instruments teeth.

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51 “This inheritance from the war years needs therefore to be looked at from the point of view of the use it can be put to during the forthcoming period of reconstruction.” Dhananjaya Ramchandra Gadgil, Publication No. 30 Economic Policy and Development (A Collection of Writings) (Poona: D. R. Gadgil, Gokhale Institute of Politics and Economics, 1955), 79. and Knight, Food Administration in India, 1939-47, 189.

During the initial period the Corporation will observe how the market operates and intervene to the extent necessary to ensure that the objectives set out above are achieved. The aim is for the corporation of India to acquire a strategic position in the foodgrains trade.\footnote{Ibid, 4.}

A good example of how these discretionary powers were expected to work was seen in the proposed initial stages of the corporation. At the first stage, in 1965, operations were to begin in Madras State (after 1969 a large portion of the Madras State became what we now know as Tamil Nadu), managing rice and paddy. Since they expected to purchase large amounts of stock at fixed prices, they needed to ensure that no vested interests would bring their rice stocks to sell to the state at inflated rates. To achieve these closed boundaries, the FCI asked that they be granted a monopoly on the movement of grain by rail. This would effectively prevent any non-government-owned rice from moving large distances. Regarding this monopoly on movement, the note states, “the late Solicitor General of India has advised that any legislation to secure this may be struck down as unconstitutional.”\footnote{Ibid, 15.} So, the FCI roped in the Ministry of Law, the Ministry of Finance, and the Planning Commission to plan the best course by which discretionary powers could be constitutionally wielded. To operate in these “several large spheres,” they expected to invoke provisions of the “Essential Commodities Act” to ensure “that the holders of stock sell foodgrains to the Foodgrains Corporation.”\footnote{Ibid, 13.} The other option in these conditions were an emergency-like situation in which the Defense Act would allow the FCI to suspend the rights of people to use the trains for rice-conveyance.

Perhaps the most significant aspect of the new institutions setup was that it act like a business. Given all the provisions that were put in place to ensure that agricultural credit arrangements and cooperative societies would not be disturbed by the new institution, “Care will,
however, be taken ... to see that these attributes do not come in the way of the Corporation building itself up in a businesslike manner.” The main check against the discretionary powers of the Corporations was a public audit presented to the parliament every year and published in an annual report. Yet they did not want the audit to hamper the project. Since the FCI

will have to function as a business undertaking and take decisions of an important nature from day to day, it will be impossible to function if the organisation is subject to the standards of special audit normally applicable to departments of the Government.  

In this way, a contradiction was built into the nature of the FCI itself. It was expected to function as part of the government’s machinery, and yet work as little like a government undertaking as possible. This idea would later determine the architectural form of its headquarters, which was built in New Delhi in 1972. The proposal for the FCI was approved and it became law in January 1965.

The Inauguration

On the January 14, 1965, Chidambaram Subramaniam presided over the inauguration of his new institution, the Food Corporation of India (FCI), in Madras, where it was to begin operations. At the ceremony, the minister gave the inaugural address, in which he took pains to explain the conditions that led to the formation of this institution as well as the ways in which it was expected to change the food situation in the country. This inaugural speech was part of the larger publicity strategy to build support for this new institution across state lines. In the address, Subramaniam asked: Where, between politics and economics, did the FCI sit? What political role

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56 Ibid, 7.
would the FCI play, and how did it expect to manage the economic problems around grains and scarcity?57

The speech attempted to convey the scale of the endeavor and the justifications for designing this “instrument of policy” to perform what might seem to be contradictory functions. He began with perfunctory gestures to the history of food bureaucracies, locating the origin of his organization in the prices subcommittee of V. T. Krishnamachari, although there are no organizational symmetries between the two; he then explained the government’s position on foodgrain management.

Subramaniam outlined the problems facing the country. First, even at the best of times the country relied on massive grain imports and the charity of foreign countries. Second, there was an unevenness of ecology and economy, both spatially and temporally. Here, his address echoes Neil Smith’s key argument that the “uneven development of capitalism is structural rather than statistical,”58 though this unevenness is always presented as natural. This unevenness, Subramaniam explained, had historical and economic causes. He remarked, tongue in cheek, that India’s uneven economy would make a great case for an economics essay, but essays were of no help to the government: politics took place outside of the academic essay, where starvation lived. Through this tongue-in-cheek pitting of politics against economics that nonetheless acknowledged both as major factors in managing agricultural production and distribution, Subramaniam was setting up the necessity of his all-encompassing institution.

Subramaniam underscored the reason the government was fighting a losing battle against hoarders: despite its buffer stock, the government could not out-hoard the profiteering class in this situation.

The trading community knew that the Government’s exhortations to them could not be so effective so long as there was no adequate buffer stock of foodgrains with the Government. The situation of living from ship to mouth as a result of the stagnation in the food sector and the absence of buffer stocks had placed the community at the mercy of what little conscience the trading community had.59

The minister described the problem the country faced as a battle between economic forces and political aspirations.

Many economists told me, it is not possible to short-circuit the laws of economics and that when there is imbalance between demand and supply, prices will inevitably rise. This theory is no doubt a convenient one to expound in essays on economics. But in the practical world of politics, it would be a foolish government which tells the poor and the starving that they have to starve because the laws of economics ordain it. Society will not excuse a Government which repeats ad nauseum laws of demand and supply and lets the trade reap an uncontrolled cost to the community.60

But then, he continues to argue that politics alone cannot solve the issue.

At the same time we have to keep in mind the fact that no country has been able to extend its agricultural production on the basis merely of legislative and executive fiats. It is only on the basis of an incentive and remunerative price to the producers that an agricultural economy can increase its production.61

In sum, a trifecta of problems faced the Minister of Agriculture: low production, shortage, and hoarding. In formulating the problem as such he was rehearsing arguments from two different strands of thought about famine. On one hand, he rehearsed Bengal Famine narratives. The Bengal Famine of 1943, which killed three million people, occurred at the confluence of three smaller disasters: a cyclone that destroyed a rice crop, the loss of Burma and thus Burmese rice to Japan, and the ascendance of World War II. Although the Famine

59 Chidambaram Subramaniam, “Inauguration of Food Corporation of India at Madras on 14th January 1965,” 2–3.
60 Ibid, 2-3.
61 Ibid., 3.
Commission itself concluded that the famine was caused by the dramatic shortage of grain, most other writers and economists argued that unchecked hoarding and speculative price rises forced grain out of the rural markets, into the cities, and out of circulation. Two lessons that came out of the Bengal Famine are important here: first, that managing food and managing bodies became a key factor in legitimizing an independent state; second, that famine was not the result of lack (the absolute dearth or absence of a commodity), but rather the result of scarcity (a market condition that makes a commodity too expensive for some people to buy). Thus, when Subramaniam argued for “buffer stocks,” he was referencing the second of lesson of the famine while fulfilling the first.

However, Subramaniam also made the case for a technoscientific intervention into agriculture to increase production. This argument contravened the lesson of the condition of scarcity that caused the Bengal Famine. In the Bengal Famine, there was no shortage, but, in the technological interpretation of agriculture, a shortage of food—that is, an absolute lack or dearth of grain, rather than scarcity on the market—was considered the key problem. So, two opposing histories came together in the creation of the FCI: the need to manage grain prices to respond to artificial scarcities and the need to encourage production to prevent real shortages. Subramaniam’s circular argument went thus: a shortage of production has led to an economics of price increase. Politicians cannot let people starve because of the laws of economics, and yet politicians also cannot, like King Canute, command the earth to produce more food. But technology can help us produce more food, so we need more technology in agriculture.

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The FCI was set up as an organization that would act in divergent, contradictory ways. This is to say that only the “state” could command multiple different forms of power that were not coherent among themselves simultaneously. The state was to become a benevolent hoarder to simulate an open-market-like condition in which hoarding no longer made economic sense. Through this technocratic politics, the state switched tactics. While its earlier tactics involved pushing back against the economic forces of supply and demand by forcing prices to conform to affordable benchmarks, the state now aimed to create an environment in which the market itself would result in affordable prices.

It is admitted that this policy does involve a certain measure of control on the movement of foodgrains. But control is inevitable as the need to build dams and reservoirs in the flowing rivers in order to make effective use of our water resources. Freedom does not mean license. It involves the need to discipline the behaviour of society to serve the greatest common good of its members. In analogizing the formal similarity between the dam and the silo—both are storage structures that also serve as points of distribution—the minister drew on existing support for dam building as nation building. The structural analogy here is that a stored commodity has the potential to affect future prices. This was only possible if the state became a hoarder, albeit a benevolent one: “it is my definite and clear understanding that only on the basis of an assured buffer stock can we discipline the prices in this country.” He reiterated this attempt at spatial and temporal control:

I am confident that the Food Corporation will command the confidence of farmers and consumers and will become as effective as the Commodity Credit Corporation of the United States in building up an ever normal granary to stabilise the prices over time and space.

He concluded his speech by arguing that the FCI acted as a critique of both bureaucratic inefficiency in the public sector and the vested interests of traders and society. In being able to

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64 Ibid, 5.
perform this double function, he postulated that the planned economy could even out the unevenness endemic to modern grain geographies.

The Defense

“This is the new strategy which we have evolved and I can assure this House that this has been decided upon not by politicians but by technicians, by scientists, by the agricultural economists, by the agricultural administrators.” Subramaniam, “Address to the Lok Sabha, Food Debates”

In the first two crop seasons after the FCI was launched, the country continued to remain dependent on PL 480 grain from the United States. The crop seasons 1964-65 and 1965-66 both saw failures in the monsoon and even more extreme fluctuations in grain output. The 1964-65 crop failures tested the Indo-US relationship; Lyndon B. Johnson was now president, and the American offensive in Vietnam did not sit easy with India’s non-aligned policy. Johnson, in no mood to emulate Eisenhower’s long-term food donation supply plan, chose to adopt a “short tether policy.” Instead of a formal wheat donation agreement, he chose to extend and withdraw aid on a month-to-month basis. This constraint, coming at a time of grain shortages and food riots, was sold with rhetoric about forcing the modernization of India’s agricultural sector.

In December 1965, the upper and lower houses of the central government met for their winter session after a particularly bad agricultural year. In part because of low rainfall, food production hit unexpected lows when the FCI barely had gotten off its feet and Subramaniam found himself forced to defend his Ministry. At the winter session, he gave opening addresses at both houses and answered questions. In these addresses, he outlined the situation in which the

65 M24DofA-GIPF
country found itself and attempted to keep the FCI out of the conversation, given that it was struggling as production levels dropped and prices rose.67

Taking pains to outline the scale of the failure of the monsoons across different geographical regions in the country, Subramaniam announced that the total shortfall expected in that year amounted to 4.5 million tons. The food conditions forced a continued reliance on PL 480 grain from the US, which had become exceedingly insecure under Lyndon Johnson’s administration and increasing global disapproval of the prolonged Vietnam War.

As far as possible, Subramaniam kept the FCI out of his speech. Instead, he pointed to various political and implementation failures to bolster the case for the corporation’s discretionary powers. “Maharashtra also tried … monopoly procurements during the last year, but unfortunately, because of certain deficiencies in the system of monopoly procurement, they did not make a success of it.”68 Here he made a contradictory argument. Even while he argued that monsoon failures and scarcities had made procurement substantially difficult in Maharashtra, he argued that the situation of scarcity made it even more important to procure grain.

What is the implication underlying, what is the rationale behind this statutory rationing in urban areas? If whatever surplus is available in rural areas and in the various areas, is allowed to go free, naturally it would flow to the area where there is higher purchasing power.69

Here Subramaniam referenced the Bengal Famine, where such a situation had occurred. The Bengal Famine loomed large in the state’s food policy, and that policy had staying power even when there were major ideological shifts in the administration.

67 Subramaniam and Members of Parliament, *Food Debate in the Lok Sabha and Rajya Sabha*.
68 Ibid., 12.
69 Ibid., 25.
The parliamentary debates demonstrated that the two years of failed monsoon were catalytic environmental hardships that gave a fillip to technocrats within the government to push for the industrialization of agriculture. In these debates, Subramaniam, himself a technocrat, defended the government on the grounds that it was in the process of bringing about technological change, particularly using fertilizers and hybrid seeds as a means to increase productivity. He ended by assuring MPs that the government was not making political decisions, but rather that all these decisions were made by experts. He concluded:

We are taking up this programme in an intensive way during the Fourth Plan period. It is the package of better seeds, fertilisers, plant protection and water control of irrigation which gives optimum yield.\(^70\)

**Hybrid Imports**

Forced by weather-related crop failures, the planning commission increased its emphasis on agriculture.\(^71\) The department had already been experimenting with hybrid wheat and rice in 1965. In 1966, India imported eighteen thousand tons of hybrid wheat seed from Mexico with which to implement modern agricultural practices in the subcontinent and launch what would later come to be called the Green Revolution. This import of a high-value experimental commodity required special attention, and the Ministry of Food and Agriculture sent a three-man mission to Mexico to safeguard the operation. Each person on the team had a specific task: the first negotiated a deal to bypass the seed agency and acquire cheaper wheat directly from farmers; the second inspected ten thousand acres to select the highest-yield grain for purchase; the third managed the cleaning, bagging, and storing of the commodity to transport it safely by ship to India. The project did not end with the seed’s safe arrival in India. Farms

\(^70\) Ibid., 70.

needed preparation and farmers needed training. Critics worried that these yet barely tested foreign seeds would poison the soil while monopolizing the already scarce fertilizer. But these concerns were not immediately visible in the short term and over the next two years, the government worked to overcome logistical setbacks.

The Indian Agricultural Research Institute (IARI) worked with the Ford Foundation to select farmers to participate in growing this experimental commodity. Should the project succeed, these farmers would become bearers of this knowledge through the Intensive Agricultural Development Program (IADP), which became the conduit through which scientific farming entered the countryside.

Executive Archives

The National Archives of India stores declassified documents that have been transferred to the archives from Ministries. In the case of the Ministry of Food and Agriculture and their Department of Storage, the documents in the archive cover the period between 1950 and 1961, which saw an intense effort to build storage infrastructure and push through plans on sites across the country. However, no documents from the early 1960s are available in the archive. In 1964, these documents were transferred from the Ministry of Food and Agriculture to the new Food Corporation of India. The FCI was imagined as an executive body as opposed to a

72 Also watching carefully the unfolding narrative of the food crisis were Indian scholars, between whom intense debates on government policies and practices raged. Each offered a theory for the failure of a foolproof system of production and distribution and the role played by the government’s policy in this failure. Treating the various variables as parts of a systemic whole, the economists argued over which aspects of the state’s policies had failed. One such controversy, between Dandekar and Dantawala, centered around whether artificially low procurement prices had dismantled the market system and taken away the incentive of the farmer to produce, or whether the market systems in India were flawed to the point of needing continuous support from the state. M. L. Dantwala, “Incentives and Disincentives in Indian Agriculture,” Indian Journal of Agricultural Economics; Bombay 22, no. 2 (April 1, 1967): 1–25; V. M. Dandekar, “Agricultural Price Policy: A Critique of Dantwala,” Economic and Political Weekly 3, no. 11 (1968): 454–59; M. L. Dantwala, “Agricultural Price Policy: Reply,” Economic and Political Weekly 3, no. 11 (1968): 459–61.
legislative one like the Ministry. As a result, the FCI’s working documents were no longer seen as part of the legislative process but as part of the executive process. Legislative documents were transferred to the archive; executive documents were not. Thus, all documents from the FCI were housed in their own storerooms until there was some drive to clean up the paperwork, when all materials would be destroyed.\textsuperscript{73}

How is one to write a history of an institution whose archive is thin by design? This chapter relies on material from journals such as the \textit{Indian Concrete Journal}, which published updates on work happening in concrete around the country and the world, and the \textit{Journal of the Institute of Architects}, which documented projects, talks, and general intellectual work being done in the state-connected architectural community in India. Along with these, the FCI’s \textit{Annual Reports} contribute much valuable material, and news reports from the time frame events around the infrastructural project. Apart from this, Ford and Rockefeller journals and publications as well as USAID documents were also useful, as these have many accounts of construction projects from outside the FCI.

In 1967, the Ministry amended the FCI Act. At this point the major bureaucratic operation underway was to transfer responsibilities from the Department of Food (within the Ministry) to the FCI. In the first year, the FCI’s storage consisted largely of godowns transferred from the Ministry of Food and Agriculture to its jurisdiction. Employees were also transferred. This affected the seventeen thousand employees of the Food Department who would become surplus as the tasks they managed were transferred to the FCI.\textsuperscript{74} Because the FCI was a

\textsuperscript{73} Vivek Chibber describes this condition of lost material in ministries and the difficulty of writing histories of this period given the lack of archives in the preface of his book on the failure of India to launch an industrial state. Vivek Chibber, \textit{Locked in Place: State-Building and Late Industrialization in India} (Princeton, N.J.: Princeton University Press, 2003), xi.

\textsuperscript{74} Note for the Cabinet Amendment, 1967, FCI, MoFA, 4.
technically NOT a ministry, it created an odd bureaucratic problem: employees moving out of
the Ministry of Food and Agriculture would need to permanently sever their relationship with the
government so that they could be re-hired by the FCI to continue to do their old jobs. This
undermined the job security that came with working in a ministry. After some debate between
the staff association and the ministry, an amendment was made to the FCI bill to allow for the
transfer of staff at the institutional rather than personal level. This points to the institutional
nature of the FCI: it was neither analogous to nor a part of the Ministry of Food and Agriculture.

World Bank Aid for Silos and Storage

After transfers of storage sites were well under way, the FCI began its negotiations with
the World Bank to construct more storage. In 1971, the World Bank released their first storage
project appraisal report, which brought the Bank and the Swedish Government to finance a
storage project in India. The fifteen million dollar project involved a one-third share for each
party; over the next four years, storage was constructed across the country. The project was to
construct 3.5 million tons of foodgrain storage, 75,000 tons of port silos, and facilities to handle
and transport the commodities (Figure 7.2). It also included grain procurement centers and
training programs.

In 1975, India entered a second round of negotiations for aid for storage construction.75
An extensive proposal made by the administrative staff college in Hyderabad called for
construction of three million tons of storage at five sites in surplus states across the country—
Moga in Jagraon, Mandi Gobindgarh in Punjab, and Lucknow and Khurja in Uttar Pradesh. The
proposal was then sent to the World Bank to negotiate for aid. In 1977, the World Bank

75 “World Bank Aid Sought for Silos,” The Times of India, November 14, 1976, sec. Samachar, ProQuest
Historical Newspapers: The Times of India (1838-2002).
published its report proposing credit to India for the Second Foodgrain Storage project. The project was prepared by a committee in India which included representatives from Food and Agriculture, Railways, Finance, Planning, the FCI, and the Central Warehousing Corporation. Negotiations took place in Washington in September of 1977.

These World Bank negotiations masked a deep structural suspicion of the organization. In 1966, a team led by Bernard Bell had entered India and conducted an exhaustive survey of its economy. In turn, it had recommended that the country step away from its Nehruvian industrial agenda and focus on agriculture. In addition, they suggested structural adjustments and the devaluation of the rupee. Indira Gandhi’s government, after much deliberation, devalued the rupee, a move that led to widespread anger and suspicion of collusion between the US and the World Bank. The entire event shaped both how India would deal with the World Bank and how the World Bank would approach countries in the developing world.

The World Bank distanced itself from US policy to ensure that it was seen as independent. India, on the other hand, isolated World Bank loans to the agricultural sector and remained wary of its structural adjustment policies. As a result, much of the loan money was funneled into storage structures, which negotiated between the production of grain and its distribution through the public distribution rationing system.
The FCI functions via a series of logistical decisions. At the beginning of the season, agricultural economists from the FCI and the APC hold meetings where they review weather and crop status and determine what the amount of grain they expect to be produced that year and what percentage of the crop the FCI should purchase and manage. They also decide what prices should be offered for grains, including the maximum price the FCI would pay and the lowest price that would be fair to farmers even if production were to rise and prices were to fall. (If farmers can get better prices than those of the FCI elsewhere on the open market, they are completely free to sell their goods independently.) Having made these decisions, the FCI dispatches its subsidiaries to the mandis (markets) and begins to acquire grain in surplus states through auctions (Figure 7.3, 7.4). There is an element of risk management here: by attempting
to predict how much grain will be produced in the coming year and what demand will be made, the FCI tries to manage these future uncertainties through data as much as possible.

In the next stage, grain the FCI has purchased is taken to local godowns (warehouses) where it is stored and managed by government agencies including the State Warehousing Corporation, the Central Warehousing Corporation, and the FCI. These stocks are then stored until the central government decides where there are deficits. After this decision is made, grain is
transferred by rail and truck to the deficit state and stored there in godowns owned by the state or outside agencies on contract. At that point, grain is handed over to the Public Distribution System (PDS) and stocks go to the Ration Shops where the ultimate benefactor can purchase foodstuffs at subsidized and regulated prices.

Figure 7.4. Wheat at a market in Punjab at harvest season. Image from the FCI Annual Report.

It follows that the silos and warehouses were not simply storage devices, but rather acted as logistics junctions. They were infrastructure hubs at crucial points of juncture between spatial movement and temporal movement. The FCI attempted to simulate open-market, liberal
conditions without exposing the planned economy to the risk of the uncertainty of the liberal model. It relied on expertise to manage risk in the future.

**Buffer Stock and the Expertise of the Benevolent Hoarder**

“it is my definite and clear understanding that only on the basis of an assured buffer stock can we discipline the prices in this country.” — Subramaniam, Inaugural Address, 1965

In 1969, the Indian Society of Agricultural Economics held a seminar in Bangalore to analyze the “Problems of Buffer Stock.” The seminar set out to understand how much buffer stock the government needed to acquire. The question was posed in this manner: given the average fluctuations that grain production has had from the mean in the past two decades, and the abnormally large fluctuation that occurred in the past three years, what amount of grain should the state acquire in order to equalize supplies in nineteen out of twenty years? The group concluded that the answer was seven million tonnes (a tonne is a metric ton, or one thousand kilograms).

What is a “stock”? The group began by differentiating between general stocks and buffer stocks:

Generally, stocks are maintained to even out seasonal flows of a commodity. Since agricultural production is seasonal, stocks are necessary to keep up a continuous flow over the year. Buffer stocks, however, … are primarily intended to even out inter-seasonal fluctuations in production rather than intra seasonal supplies.

This was a means for the group to specify that their interest was primarily in buffer stock. If there were scarcity, there needed to be buffer stock. (This raises a question about why the government still holds buffer stock, when there are no conditions of scarcity facing the country).

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76 Chidambaram Subramaniam, “Inauguration of Food Corporation of India at Madras on 14th January 1965,” 5.
78 Ibid., A63.
today by their own estimates.) Buffer stock helped the government maintain certain forms of control over the food economy outside of simply managing scarcity.

The main purpose of buffer stock was to manage fluctuations, and this could only work if fluctuations occurred within a statistically normal range. Should “abnormal” fluctuations occur, they would not be manageable by buffer stock operations. The conference was trying to scientifically normalize abnormal fluctuations. Buffer stock was a method of managing both manageable risk and unmanageable risk. Embedded in this seminar was a question that went beyond computation, that yet had to be answered by computation: how do we make decisions about an unknown future? How do we contend with the fact this the past two years were unknowable by past data?

These legislative fiats and economic imperatives came with physical and spatial consequences. Infrastructure was not only necessary to implement certain policies but also shaped those policies. That is, commodity cultures were coproduced by political will, economic forces, and technological possibility. For instance, one paradoxical result of the buffer stock policy is that while having a buffer stock allows the state to prevent the market value from rising, the management, transportation, and storage of the stock itself increases the cost of the commodity in question. The group of agricultural economists suggested managing this opposing force by separating out these costs. They suggested that the cost of maintaining buffer stock be allocated from the Five Year Plans rather than factored into the price of food itself.
The Green Revolution and Storage

In its first year, as I have mentioned, the FCI’s storage consisted largely of godowns (warehouses) transferred from the Ministry of Food and Agriculture to its jurisdiction. Only in 1971 do documents about silo construction begin to show up in the historical record. Although there had been a sustained effort to manage a buffer stock, the early years of the FCI saw the transfer of properties from the Ministry to the Corporation. At the same time, the FCI began to draw up plans to build new storage. In 1968-69, agricultural production began increasing, and this put pressure on the FCI to increase storage capacity. The FCI needed to reach the target of seven million metric tons as set out by the agricultural economists in 1969. As the FCI grew in its operations, it began to manage larger and larger quantities of storage. The corporation began with a continued reliance on the government:

Pending creation of an adequate engineering organisation in the Corporation, the maintenance and repairs of the depots transferred by the Central Government continued to be attended by the Central Public Works Department.79

The first round involved transferring storage facilities from the GOI to the FCI. Subramaniam appointed K. T. Chandy, Director of IIM Calcutta, to the storage division. This appointment indicated the nature of storage: the storage site is a point for transferring both responsibility and grain.

Anticipating the problem that would arise in moving the procured grain to storage and consuming centres, following the bumper rabi (winter) harvest, anticipated in the Punjab and Haryana States, a well-coordinated rail and road movement plan drawn up by the Movements Branch at the Head Office of the Corporation. The movement set-up at the Regional Office at Chandigarh was strengthened to ensure implementation of the programme.80

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The silos, the warehouses, the cover and plinth (CAP), the railways, the truck transport, the grain market: the FCI sites are points of dense infrastructure, dense nodes in a network where exchange can happen. These junctions make the system work.

Figure 7.5. A modern grain market in Haryana, image from the FCI annual report, 1975-76.

In the wake of the Green Revolution, we see storage emerge as instrumental to the managerial state: storage arrests the life of wheat grains, allowing them to neither grow nor decay, as an infrastructure for delayed consumption. Here, biopolitics interrupts the flow of grain—biologically, chemically and economically—precisely in order to unleash it into a future distorted economy as a corrective to markets that favored traders over the producers and
consumers of grain. Through the silo, the FCI manifested the calculable state, managing the wheat market by carefully balancing price supports with total outputs at the central and state levels through a series of government bodies. Each of these gathered or disseminated either information or food to support the FCI, which has now become one of the biggest supply chain managers in Asia.

But managing silos was cumbersome, requiring huge capital outlays and skilled workers to both construct and administer them. With the increased volume of grain coming in from Punjab as a result of Green Revolution methods and technology, the FCI had to improvise. Soon they started experimenting with open air storage, first at their facility in Manmad and later everywhere else. Thus, we see the invention of the “cover and plinth, an “indigenously invented” alternative to silos (Figure 7.6).

Figure 7.6. A publicity image of cover and plinth from the Naraina storage facility. The silos in the background are empty.

“Cover and plinth” consisted of exactly that: a plinth below the grain and a cover on top made of a low density polyethylene sheet. While the plinth protected the grain from soil moisture
and rodents, insects, and pigeons that might attack it, the cover had two functions—to protect the grain from rain and to create a closed environment for fumigation. Although the covers might seem more low tech than the modern silo, they are not! The LDPE sheets were the product of new oil economies, holding in chemical insecticides while keeping out moisture.

The FCI managed the huge apparatus involved in purchasing, transporting, storing, fumigating, and managing grain. It follows that each of its nodes of infrastructure and architecture acted as logistical junctions. These were hubs at crucial points between spatial and temporal movement.

The word logistics was coined during World War I to refer to the art of decision making involved in moving supplies and troops on the battlefield. It entered the lexicon of the FCI as the body grew to encompass more and more territory across which, like troops, it had to move grain in its war against famine.

The FCI Building

Even as the FCI expanded its range of functions, it commissioned its headquarters in Delhi. Although the FCI began its operations in Madras, it eventually expected to be headquartered in Delhi, where it could command the foodgrain economy in proximity to the central government and the Ministry of Food and Agriculture. For this purpose, the architects Messrs. Kothari and Sons were hired and a parcel of land on Barakhamba Road was purchased for the project (Figure 7.7, 7.8).
Figure 7.7. The FCI building in New Delhi, built as part of the 1962 development plan.
Narendra Kothari began his career at the firm of Master, Sathe and Bhuta in Mumbai, later moving to Delhi to open his own office. Kothari himself was rather young at that point and he did not share the enthusiasm of his contemporaries for creating the style of Indian modernism for the state, but rather was more interested in the problematics of spatial logistics. The only record of the building is in an article in the Journal of the Indian Institute of Architects that has

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81 As a result, the office has not archived any of the material of its projects, in an odd mirroring of the archival situation at the FCI itself. In this sense, his appointment to build the FCI headquarters was quite appropriate. Interview with Anoop Kothari, Delhi 2015.
preserved a drawing and plans for the project in print. This article reports that the Master Plan for the project site had already been prepared by the Delhi Development Authority (DDA). The site itself was in the eastern quadrant of the commercial land around Connaught Place. This quadrant had not been planned under the Lutyens-Baker scheme; in choosing the site, the DDA hoped to use this land to connect Lutyens’ and Baker’s plan to the older parts of the city, expanding this colonial commercial center to accommodate a growing urban population and economy. This plan, in which the Ford Foundation exerted considerable influence, contributed to a new masterplan for Delhi that conformed to modern problems of circulation and land use. Following from the masterplan, the project was constrained by a new set of building bylaws, which determined that its massing and its general form would differ from the government-architecture that came before it. The DDA required that the ground floor be free for vehicular traffic and the podium level be mainly a public piazza for pedestrians, which the architects provided. However, the compound is no longer open to public, and therefore these are not functional. Thus, the logistics and aesthetics of the building came directly out of the new imagination of the city.

The building itself was designed to be different from the “sarkari” (bureaucratic) typology—a typology that implies a building whose sole purpose is to satisfy a program, specifications, costs, and time constraints. In the 1950s, several buildings had been constructed in and around the colonial governmental plan, but limited funds had seen this architecture attempt to emulate the aesthetic of an Indianized classical style envelope with double-loaded corridors and dog-legged staircases (Figure 7.9).

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The FCI building had two service cores in the center that divided the building into two unequal parts. On either side of the building were two large concrete triangular wall columns housing the toilets and the service spaces. The structures of these end cores were in reinforced concrete with tapering walls which ostensibly helped to stiffen the structure against earthquakes. The floor plan in between the three structural cores was open, with nine large columns.

The building features a structural system based on a grid of five-foot three-inch modules. These spaces allowed for cubicles or for office pools. The planning “enables great
flexibility in officer’s cubicle planning. For example, a typical cubicle of 160 square feet has only two units. Further structural ribs at 5’ 3" spacing permit fluorescent tubes of 4" length to be conveniently fixed on the soffit ceiling.\textsuperscript{83} The building was inspired by Gio Ponti’s Pirelli Tower in Milan, for which Pier Luigi Nervi had done the structural design. In referencing this post-war skyscraper, Kothari was laying claim to an architectural paradigm separate and distinct from the lineage of modernism that was founded on Le Corbusier and his design for Chandigarh that had marked the Nehruvian imagination of aesthetics.

This aesthetic reference marked the entire project, including the institutional nature of the firm that designed it, seemed to function as part of the new economy of construction. Both firm and institution contained in-house departments to handle all the logistical tasks at hand: the architectural firm employed its own structural engineers, lighting consultants, and weather experts. The FCI contained its own transport, storage, and construction departments.\textsuperscript{84} As a result, a parallel imagination emerged from the city, the building, and the corporation.

Subramaniam Speaks at IIM: The Managerial Logic of Wheat

Standing at the head of Louis Kahn’s IIM Ahmedabad building, now promoted to the Union minister for Planning, Chidambaram Subramaniam, riding the success of the Green Revolution, gave the convocation address to the graduating management students of 1972. He announced that the central government was thinking of evolving a distribution system for essential commodities in the public sector.\textsuperscript{85} The point was to build a “proper” link between producers and suppliers. Government regulation would achieve two goals, he argued: one,

\textsuperscript{83} Ibid, 7.
\textsuperscript{84} For comparison consider that today architecture firms don’t perform all functions in house, and the FCI too is outsourcing various aspects of the process of construction through private public partnerships.
providing food for the weakest members of the community through rationing, and two, stabilizing prices to benefit directional planning. The proposed network of procurement and distribution was to be the key feature. An earlier news report had used the word “scheme” to describe it, but Subramaniam made no mistake in avoiding the word. After all, the project he articulated was significantly grander in its conception; it was to be a public distribution system—“a machinery” that would take control of essential consumer goods and perhaps even basic industrial materials. While Subramaniam claimed no new instruments, through the artifice of juxtaposition and arrangement he recalibrated the many discrete tools and pliers of economic adjustment and food supply into an interlocking apparatus—a system.

Thus, the knot of food supply and justice was embedded in a system of information flows and organizations. By storing wheat in silos and statistics in databases, the system could now regulate and readjust the surpluses and deficits of the various wheat zones in the country. This grand equipment amalgamated the institutions of state and central trading and warehouse corporations, the FCI, the grain traders’ association, markets, ration card bureaucracies, and economists, both neoliberal and Marxist. The system had the grain silo on one end and the ration shop on the other. These objects may seem asymmetrical, but they have a unique isomorphic property visible only to the cybernetician.

Cybernetics

Dr. Amitava Ghosal at the Organization Management research wing of the Council for Scientific and Industrial Research (CSIR) was one such character: he applied cybernetic models to planning problems. In 1969, he published a book called Some Aspects of Queueing and Storage Systems, proposing in it that, under certain conditions, the queue and the inventory could be considered isomorphic systems. Each had something coming in: water into a dam, grain into a
silo, inventory into a store, and the customer into a queue. Each value spent a certain amount of
time in the storage facility or queue, and when it had finished its time there, it left. If there was
no more room, the customer would leave or the dam would overflow. What made the queue the
most interesting to Ghosal was that the customer could gauge the queue, its length and rate of
change, and decide on the best option available. The queue was a spontaneous, self-organizing
system—a model of adaptive storage with a feedback loop built into it. The rules derived from it
could be used to guide other systems into homeostasis. Yet there was something perverse about
turning the queue for essential goods and services into a purely spatial and rule-based model:
Ghosal presumed that the patron waiting had a choice.

Consider what happened on April 21, 1973, twenty days into the government takeover
of wheat distribution. Mumbai’s fair price shops ran out of their supply for about six days.86 The
Congress Party government diverted the entire stock of the country’s mobile grain toward the
city, where waiting in queue for hours on end became a standing joke in newspapers. How does
the cybernetician remodel the queue when there is nothing left to be distributed? Cartoonist R. K.
Laxman commented with a drawing five days into the crisis. In it, a postman departs in the
background while a woman reads a letter to her son: “It’s from your daddy, says he is safe, and
will be back from the ration shop in a couple of days” (Figure 7.10).87 The key word in this
cartoon is “safe.” It signals another spontaneous, self-organizing system that we need to pay
careful attention to, one that we could posit as the opposite of the queue—the food riot. The
eruption of riots raises the question of the limit condition of the queue. At what point does this
orderly spatial configuration transmogrify into tumult? A 1964 news report shows this:

86 “City Ration Shops Run out of Wheat; Thousands Queue in Vain,” The Times of India (1861-Current); New
Delhi, India, April 22, 1973.
It is stated that 500 persons waited in a queue in front of a co-operative society yesterday to purchase wheat. When they were told that there was no stock of wheat, they forcibly, entered the society and removed food grains worth Rs.500. The only constable on duty nearby was overpowered by the crowd. Police reinforcements arrived and 33 persons were taken into custody. The police have registered a case of rioting, assault, and dacoity.\(^8\)

If the system is put in place for security as manifested in the queue, then is the riot simply an error in the system? Or is it the moment that the system undoes itself?

However, it is another Laxman cartoon from this mishap that poses the more foundational question. A wife holds a gnawed-on document and says, “Go and try again but remember no nibbling on the ration card while waiting in the queue” (Figure 7.11).\(^9\) Laxman wryly observed that while the ration card remained the most vital document of food security—guaranteeing you grain, oil, and sugar at stable prices—you could not eat it if there wasn’t any food. So the question is, if the silo is the reserve that facilitates control, what is the role of the ration card in the system of public distribution? In India, a ration card is the foremost document of identity. It is a document of your domicile and of your right to vote; it precedes all other forms of recognition. It is that which gives you a claim to the state. If the equipment of public distribution constitutes a bounded frame of practices, then the ration card forms the actionable object within this frame. It is that through which the subject articulates the self in relation to the state—which, in turn, produces the well-fed subject. It is a device that, in an attempt to secure lives, renders life transparent to the state.

\(^8\) “Food Riot in Harihar,” The Times of India, September 16, 1964.

Figure 7.10 & 7.11. RK Laxman’s drawings for the *Times of India*, April 24 and 25, 1973.

What, then, is the landscape of universal access? India’s agricultural sector, now far more secure, sponsored yet another agricultural fair. This one, the Agri-Expo’77, foregrounded the Indian pavilion. The land itself had morphed from the nondescript fair ground on which Yamasaki put up his pavilion into the magnificent concrete frames of Raj Rewal and Mahendra Raj. Faculty and students from National Institute of Design were commissioned to plan the rural displays and the graphics for the event. One could argue that many architectural projects emerged from this new landscape of the state: Raj Rewal’s metabolist State Trading Corporation in Delhi and Anant Raje’s semi-wholesale market in New Bombay are just two examples. If the Nehruvian period was characterized by Edward Durell Stone’s US Embassy and Minoru Yamasaki’s American pavilion, then the years of public distribution were marked by these other architectures, which were not simply about forging a modern Indian identity, but rather were attempts to conceptualize the space of the state and their own place in the system. Together these buildings can be read in a Baudrillardian fashion as a system of objects instantiating the state as the ultimate totality. Similarly, if the silo provided the image for Nehruvian ideals of modernity, it was its inverse, the cover and plinth (CAP) system of storage, that dominated the landscape of universal public distribution.

To secure the body, the state had to secure wheat. Wheat came to stand in for flesh. One might presume that the point was to get the wheat into the body, but that was not the only
function of grain. Wheat secured the value of labor—that is, people’s capacity to exchange their labor for wages. CAP storage displays actual wheat: you can see the bags, just as you can see the piles of wheat in the market where they demonstrated the FCI’s power. Silos, on the other hand, hide their commodity, and many of them stand empty today. The silo at Mayapuri, built with the World Bank, stands empty “because of cracks,” while CAP storage is extremely easy to repair. Impeccably maintained on the outside, the silo acts as ornament to the state’s technological capacity.

**Cover and Plinth**

As the FCI constructed its modern headquarters, it also assessed its capacity to scientifically store grain over long periods of time. The annual report mentions that

Large scale trials were also carried out at Manmad in Western Zone to keep wheat stocks in the open. The storage was planned so that wooden crates were used to provide full protection against damage from below and specially prepares polythene covers were used against damage by rain and adverse weather. This method of storage is not being used extensively by the Corporation to supplement regular storage space. (1970-71)

The following year, the FCI reported an increase in CAP: “The Corporation also had 8.6 lakh tonnes of CAP (Cover and Plinth) storage facility.” In 1971, “Two butyl rubber silos, each of 250 tonne capacity were imported from the UK and installed in Khanna Punjab to ascertain the behaviour of silos for storage of foodgrain under Indian climatic conditions” (Figure 7.12).

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90 Interview with Deputy Director, Naraina, January 2015
92 Ibid., 8.
During this period of growth, a debate broke out among agricultural economists, engineers, and technocrats, about what kind of storage the state should spend its money on. Uma Lele, an economist at Cornell University, wrote a performance analysis of the new foodgrain policy in which she summarized the debate, “Concern has been expressed about the costs and benefits of flat versus silo storages. The debate was prompted by rather high costs of construction for some recently built silos in India.” Silo construction benefitted the concrete and construction industry greatly and led to fewer losses of grain over the long run, but it was expensive. Flat storage required the acquisition of more land because it needed greater areas to store similar amounts, but it was labor intensive and therefore cost effective in the short term. Flat storage lent itself to storing multiple different types of grain at the same time. It was more flexible as storage, but it came with weaknesses best represented in the overwhelming number of photographs published in newspapers about rotting food under government care. (Do a Google image search for “India rotting wheat” to see what cover and plinth storage looks like.)

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As the annual reports show, although there was a desire for silo storage, there were minimal efforts to build new silos. Rather, the FCI found itself reliant on cover and plinth, a technology that was “invented indigenously” as the counter to silos: it was low in capital investment, it required a large but unskilled labor force, and it manifested the horizontal against the vertical stacking of the silo. The plinth and its Low Density Polyethylene (LDPE) cover, it seems, was the retrograde moment in the modern apparatus of the agricultural system.

It was only in 1975, after the beginning of Green Revolution output (1969), that silo construction took off with expertise and funding from the World Bank. This second iteration of storage construction—the first involved the two steel silos built in the 1950s—resulted in concrete silos in lieu of steel ones, a response to the growing power of the cement industry in India. The cylindrical shape of the concrete silo lent itself to slip-form, a technique much publicized in the *Indian Concrete Journal* by which concreting was performed in one continuous stretch, slipping the formwork upwards and using the set concrete below for support.

Yet managing silos was cumbersome, requiring huge capital outlays and skilled workers to both construct and administer them. Thus, as temporary storage, the FCI continued to rely on cover and plinth. CAP hardly embodied the modernity of the silo, whose perfect combination of form and function, of massing and material, seemed emblematic of the new industrial (American) agricultural economy. CAP seemed low tech, but it was not. The polyethylene sheets were the product of the new plastics economy, holding in chemical insecticides while keeping out moisture. The dimensions of the plinth respond to an alternate body to determine its measurements: that of the rats, insects, and pigeons that might attack the grain (Figure 7.13 & 7.14).
The funny thing about cover and plinth, particularly in opposition to silos, is that it almost seems inspired by the ingenuity of people building homes in slums in the city. The use of a combination of a waterproof cemented plinth and a polythene covered roof could only be invented in conditions of want and desperation. I would also contend that the dramatic images of rotting wheat pushed the state to shift from labor-intensive CAP storage practices to building more silos, which benefitted the construction industry. Today, even as the Public Distribution System in India is being slowly gutted, the FCI is outsourcing storage. Large construction conglomerates construct steel silos for the government through public-private partnerships and then lease them back to the state on a long-term basis (Figure 7.15).

But when the media wants to point out the failures of the state, it looks for examples of failed cover and plinth storage to make its point. The body of wheat stands in for the body politic: it both outlines the sovereign state and subtends the governmental standards and bureaucracies that were created to manage it. In fact, today, even as the FCI uses photos of piles

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and piles of wheat to demonstrate its capacity for abundance, the silos are sometimes empty ornaments that correspond to the managerial aesthetic of concrete.

Figure 7.15. An image of rotting wheat from the Toronto Star. © Copyright Toronto Star Newspapers Ltd. 1996 - 2017

CAP is always in the process of being phased out—a relic of the celebrated moment when production grew faster than storage—while steel silos are being constructed at rapid rates through public-private partnerships. While the silo offered a certain optic of modernity, it was the cover and plinth that allowed the state to accelerate into modernity through the infrastructurally-inflected political economy of wheat.

In conclusion, infrastructure is continually being remade by cultural and ideological forces. The silo began as an instrument of sovereignty, but in the process of installing that sovereignty, the storage infrastructure became an agent of governmentality, demanding new knowledge production about growing and managing grain. While wheat stands for the body, rotting wheat stands for the dying body, and the silo becomes an empty monument to the sovereign body politic.
Conclusion

The Political Economy of the Plinth

The Food Corporation of India invented the cover and plinth method of storage to manage a temporary storage problem—that is, a problem that had the rhythm of the agricultural cycle. Thus, in the process of handling the increasing growth of food production that resulted from the Green Revolution, the plinth emerged as a key architectural figure in the modernization process. As a result, plinth, like other infrastructural and design interventions, came to negotiate a fundamental tension between the political economies of distribution and production.

In chapter seven, we saw how the plinth became a sign of excess, a sign that there was now an abundance of food production, while the networks of distribution and levels of consumption still suffered problems. The plinth—as a temporary structure with an elastic capacity to manage growth—signified that, in the contest between a political logic of distribution and an economic logic of production, the latter was winning.

Growth was also the realm in which urbanism has continually faced crisis, as Aditya Prakash discovered. Prakash concluded his time in Ludhiana asking the question: how could
architects, whose products are so rigid, so definite, so prone to obsolescence, create flexibility and openness to growth? Prakash’s designs for rehriwalas—people who pushed around mobile carts selling domestic commodities like fruits and vegetables—incorporated flexibility into urban design, even if they did not remedy difficult urban conditions that simultaneously led to overcrowding and obsolescence (Figure 8.1).

Figure 8.1. Aditya Prakash’s design for mobile carts, © From the Archives of the Aditya Prakash Foundation, Chandigarh.

The question of incorporating growth into architecture was also key to Charles Abrams, the urban planner from MIT, in the 1950s. Industrialization and mass migration put great pressure on housing conditions, leading people in cities to live in squalor. In Man’s Struggle for Shelter in an Urbanizing World, Abrams addressed these increasingly inhumane conditions, tracking the different solutions that he, among others, had offered. His key concept was self-help as a strategy with which to manage squatting. Abrams posited that if people were given the capacity to help themselves build, the houses they would produce would have more flexibility to adapt to the needs of the urban poor.

Here, self-help is a key term that needs interrogation. The first question is, is this concept analogous to the Gandhian concept of “swadeshi” which loosely translates to home-
spun, which referred to the nationalist movement to use local products to promote economic self-sufficiency. Thus, the prefix “self-” was not simply the MIT planner’s imagination of a successful housing process for the post-war world, rather, it was a concept that had a long political history in India’s freedom movement.

The prefix “self,” which, as Ananya Vajpeyi has pointed out, is a complicated translation of “swa.” The prefix swa can be translated as self and swatantrata as self-rule or independence. But the self in question here was Gandhi’s focus. For Gandhi, “swa” represented the creation of a political consciousness of self. It was an ontological project. What did this idea of “self-” mean to Abrams? When explaining self-help housing, Abrams sometimes referred to cave men who built their own houses, commenting that people usually needed no more sophistication than cave dwellers to construct rudimentary shelters. Abrams used this to argue that the poor should be given as much infrastructure as possible to make their own dwellings. He positioned “technology” as something to help people survive in modern cities, arguing that it had failed as a system for the mass improvement of life.  

Self-help—which had, along with mutual aid, been practiced in different ways across the developing world—had not solved the problem of mass housing. Self-help here, unlike in Gandhi’s political project, was not about producing the political self at all, rather, self-help was about producing infrastructural conditions so that the unmodern Third World native could survive the modernity that they were not able to embody. This difference is revealed by the fact that Abrams’ self-help project failed and most of the working, urban poor preferred not to build their own houses like cavemen.

95 Charles Abrams, Man’s Struggle for Shelter in an Urbanizing World (Massachusetts Institute of Technology (MIT), 1970), 169.
When self-help failed, Abrams proposed another solution: core housing, or a unit that families could move into immediately and then expand as needed. In this second iteration, the project for housing shifted away from the ideology of self help, pivoting towards an architectural and infrastructural solution with which to manage rampant growth: core housing. In his book, *Man’s Struggle*, Abrams comments on communism, arguing that the squalor of life in a slum was “fertile ground for revolutionary propaganda.”\(^96\) The planner quotes Marx, “The intimate connections between pangs of hunger of the most industrious layers of the working class and the extravagant consumption, coarse or refined, of the rich for which capitalist accumulation is the basis, reveals itself only when the economic laws are known.” And here we are, back at hunger and the tension between distribution and growth. Abrams’ chapter on communism among hungry slum dwellers mirrored the general American anxiety that drove food subsidies, even as the US pushed a rhetoric of self-sufficiency upon the Third World.

Neither *self-help* nor *core-housing* were equivalent to the Gandhian political project for self-sufficiency or *swadeshi*, rather, they can be classified as part of the technological project of mediation. The infrastructural projects were tools of interfacing between, on one hand, the urban poor who might tend towards revolution and on the other, the liberal, capitalist economy whose only agenda was growth. Thus, the plinth, like the silo, is a structure of mediation. The most basic plinth forms a barrier between the wet earth and the house (in Gottfried Semper’s case, the dry hearth), and in the case of the food storage project, between the insect and rat infested ground, and the hygienic and sanitized chemical environment of modernity.\(^97\) Plinths mediated between the categories of nature and culture, the earth and the home. In their more contemporary

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\(^{96}\) Ibid.

forms, they also are also points at which infrastructure can erupt out of the ground and enter the home: plinths mediate between infrastructure and architecture.

This is to say that sites and services – the residential project invented by the World Bank, where architects designed the figure ground of a residential community and provided each unit with a plinth and a toilet—bears a striking resemblance to the function of Cover and Plinth storage. Both typologies are designed to provide maximum flexibility in conditions of simultaneous growth, impoverishment, and a scarcity of space.

So, to conclude, a central tension animating the ideological specter of self-sufficiency was that of production versus distribution, a tension that could be refracted in many ways—as a Malthusian famine versus a man-made famine, or the Green Revolution versus the Red Revolution. Infrastructure played a role in mediating between these two sides. While agricultural economists pushed for greater and greater investment in production, regardless of to whom the benefits accrued, infrastructure attempted to perform the role of a point of redistribution, be it the dam, the silo, or the plinth.
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