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# “Kans is king and the cultivator is his subject”: environmental history and agrarian development in modern India

# "Kans is King and the Cultivator is his Subject": Environmental History and Agrarian Development in Modern India

**Benjamin Siegel**

**Email: siegelb@bu.edu**

**Abstract:** Throughout the nineteenth and twentieth centuries, cultivators and administrators in India contended with the ravages of kans grass (*Saccharum spontaneum*), a deeply-rooted wild sugarcane that rendered productive land wholly barren. Difficult to eliminate and endemic throughout India, kans proved particularly destructive in north and central India, particularly in the regions of Jhansi, Bundelkhand, and the Himalayan Terai. Yet the fight against this ecological antagonist was bound up in broader political transformations. As India's colonial agriculture grew increasingly tied to global markets in the late nineteenth century, and these dry regions offered new possible spaces for settled agriculture, imperial administrators grew increasingly certain that mechanical tractors held the solution to its eradication. And as postcolonial Indian nationalists cast the production of abundant food as central to their political legitimacy, they held out the eradication of kans as a national aim, enlisting the World Bank as a partner. Yet by the 1960s, kans grass "disappeared" as an environmental foe, as faith in the promises of large-scale postcolonial planning were eclipsed by alternate visions of agricultural productivity. Pushing beyond the forests and waterways that have overwhelmingly characterized environmental history in South Asia, this article demonstrates how the ostensibly natural world could confound plans for agricultural development and the notions of state power which underwrote them. By taking up the region's agroecosystems, this essay underscores the inexorability of ecological concerns to settled agriculture, and offers a reminder that weeds open windows into the intertwined histories of political and environmental change. [End of Abstract]

The tractor burst through the earth, and the Central Provinces' Chief Minister, Ravi Shankar Shukla, nodded in satisfaction.[1] [**Possible place for image 4**] On March 10, 1948, fifteen thousand Indian citizens had come to watch twenty-nine HD-7 tractors tear up the hard soil. The vehicles lumbered through the thicket of kans grass, five feet tall; behind them, plows cut furrows into the earth, revealing thick tangles of roots anchoring the wild sugarcane into the soil. Soon, eighty acres of this first demonstration plot between the villages of Mundia and Sumaria would be strewn with knobby splays of *Saccharum spontaneum*. Over the following weeks, the same machinists, dispatched from India's Central Tractor Organization (CTO) in New Delhi, would plow a total of seven thousand acres. Before long, fields of desiccated weeds would teem with the promise of new food crops.

Kans had menaced northern and central India for centuries, but at the dawn of Indian independence, the weed's reign seemed doomed. American tractors, too large for local railways and thus assembled on-site, were capable of plowing under kans in a way that manual laborers never could. The ground had been softened, too, by instruments of the law. Three months prior to the tractors' arrival, the Provinces' Food and Agriculture Minister, R.K. Patil, had met with the chairman of the CTO, formulating a plan to mobilize the tractors which India had procured from the American Army Disposals Board.[2] A month later, staring at a jigsaw puzzle of land divided by the *malguzari* tenancy system, the Central Provinces' government had passed the Reclamation of Lands (Eradication of Kans) Act.[3] The law afforded the state eminent domain over infested land, allowing them to seize, plow, and reshape it, billing owners upon its return.[4] Indian administrators were certain that land liberated from kans' ravages would soon yield bounties.

Absent botanical meaning, a weed has long been seen a plant in the wrong place, lurking in the roots and shade of plants more desirable for aesthetic, nutritional, or commercial qualities.[5]

India's nineteenth- and twentieth-century histories are pockmarked by the ingress of invasive species described as weeds: the Amazonian water hyacinth that clogged Bengal's waterways, the lantana flowers that administrators in Madras and Coorg cast as "noxious weeds," and the spindly, toxic *Parthenium hysterophorus* that has grown in Indian fields since the 1960s, nicknamed "Congress grass" for its putative arrival as a stowaway in shipments of American wheat. Far more pernicious, however, was a native plant, kans grass. For centuries, its strong roots had provided material for thatching and mats, and eventually, the genetic fodder for the world's commercial sugarcane. But as arable land expanded, kans began to vex Indian administrators and farmers alike. Eradication techniques were costly, labor-intensive, or ineffective, and as it encroached on agricultural fields, the grass wrought destruction across the regions of Jhansi, Bundelkhand, and the Himalayan Terai. [**Possible place for Figure 5, map of kans-infested areas.**]

Beyond its purely agronomic effects, kans laid bare deep conflicts in India's political economy. Its rule over the soil emerged during the high noon of imperial power, undercutting the viability of India's commercial agriculture. The eradication imperative weighed deeper upon independent India's leadership – animated by the need to grow more food for a growing population – and fueled provincial, national, and international eradication campaigns. Yet these projects, tied to the promise of large-scale mechanical transformation, proved markedly less successful than bureaucrats had imagined. And as Indian agriculture advanced by different means, the weed became less menacing to politicians who had staked much on their ability to eradicate it. By the Green Revolution's heyday, kans had been transformed into a mundane weed whose extirpation required less dramatic interventions. And in recent decades, it has been cast anew as a "feral" plant suited to the disrupted ecologies of the anthropocene. Kans' "meaning"

has been transformed multiple times: it emerged as an agricultural menace as India's economy was transformed by the colonial economy, was recast as an urgent problem suited to international interventions at the moment of Indian independence, and ultimately, was reconfigured as a nuisance crop in a moment of technological change.

Over the last several decades, historians have brought weeds and invasive species to the fore in their accounts of contingency, power, and agency. Several decades after Alfred Crosby's *Ecological Imperialism* foregrounded pathogens and disruptive species in accounts of early modern global exchange, historians of North America turned their attention to the centrality of efforts to eradicate certain species in the making of the modern continent.[6] More recently, historians have cast unwanted species as productive loci for intertwined environmental and political analyses; moving beyond terrestrial nuisances, they have zeroed in on aquatic pests like water hyacinth, hydrilla, and shipworm.[7] This work has come as anthropologists have showcased "feral" and "ruderal" ecologies, offering new attentiveness to species thriving in the wake of anthropogenic disruption.[8]

Over the same decades, the broader field of environmental history has taken inspiration from imperial histories – and from South Asian history, where agrarian themes have been enhanced by newer attention to littoral and forest spaces in modern historiography. (Indeed, environmental historians have cast South Asia as an "active frontier" of the field, alongside Latin America, where the intersection of questions of environment and political economy have produced a similarly influential scholarship.[9]) But this privileged place belies major shifts in the trajectories of this work. Indian nature writers in the mid-twentieth century, including Jim Corbett, M. Krishnan, and Salim Ali were already attentive to the themes of conservation, resource use, and environmental ethics that would preoccupy a first generation of environmental

historians.[10] These concerns became more pronounced in the 1980s, as historians centered resource exploitation in India's forests and wild spaces.[11] By the mid-1990s, a second generation of scholars had come to perceive the varied strands of ecological thinking in the "official mind" of empire, alongside the complex social relationships of pastoral, wilderness, and forest communities once seen as stewards of wise use.[12] Recent work has eroded the division between the pre-colonial and colonial past, widened geographic focus into new regions and terrain, and girded new ontological complexity onto the relationships between people and environments.[13]

The geography of South Asian environmental history has shifted, as well.[14] Animated by the protests roiling Indian forests in the 1970s, environmental historians of South Asia first used the forest as a site for investigating processes of exploitation and protest before turning to questions of sylvan knowledge and scientific forestry.[15] By the early 2000s, it was possible to claim that "the writing of India's environmental history has to a significant extent been the writing of India's forest history."[16] Yet increasingly, historians have turned their gaze to the subcontinent's riparian banks, coastlines, and waterways, following a wider "water turn" in environmental history.[17] More recently, they have focused on the production of knowledge and popular politics around water, zeroing in on dams, flood control, and colonial hydrology.[18] Over the past decade, historians have foregrounded disputes over waterways within twentieth-century South Asian history, positing the centrality of water to processes of state-making.[19]

Yet these productive turns, influential on broader environmental historiography, also stole air from what had been a primary site for historical analysis: agrarian history in South Asia had once highlighted settled peasant society and the extraction of agricultural surplus in the form of revenue and rent as central to the articulation of state power. But environmental history, as Neeladri Bhattacharya has shown, was "constituted as a distinct field and defined in opposition

to the agrarian, [and sought] to recover a state of nature untouched by the settled agrarian."[20] This cleave is not absolute: the diminished field of agrarian history has moved into traditional "environmental" terrain by virtue of questions it asks about peasants and their ecological worlds.[21] Yet agrarian history in South Asia – as in the North American context and elsewhere – struggles to account for ecological change beyond the boundaries of the field or village. And with important exceptions, environmental historians tread lightly on grounds of settled cultivation.[22]

Even as environmental history has broadened its purview, this disjuncture, diagnosed in at the turn of the millennium, endures. One reconciliation may come in the form of species which transect ecological and historiographic boundaries. Studies of the "non-human" represent an evocative effort to account for the plants, animals, and infrastructural features scaffolding and inflecting human histories. Beyond charismatic megafauna and natural infrastructure, South Asian historians have identified small agents with outsized historiographic power. Cinchona plants, mosquitos, and colonial administrators co-constituted malaria as a new diagnostic category. The water hyacinth congested Bengal's waterways but divides votaries of eradication from those who see commercial futures in the plant. South India's "noxious weeds" threatened agricultural, commercial, and plantation interests, while imperial administrators' use of the law for eradication campaigns created a space for anti-colonial mobilization.[23] Likewise, kans grass helped colonial administrators enact programs and schemes suited to the late colonial economy, and in time, gave Indian administrators a botanical foe ripe for combating through national planning and international assistance.

Like all members of the *Saccharum* family, *Saccharum spontaneum* is rhizomal, propogating through a sprawling underground network of rhizomes, tillers, and shoots.[24] But *S.*

*spontaneum* also spreads through lightweight seeds: fibrous pods with gossamer webs propelling the sugarcane over distances. These diverse reproductive abilities give kans a competitive advantage over other sugarcanes; likewise, its strong stalk, cold and stress tolerance, and ratooning ability offer good genetic material to commercial sugarcanes. Like many "invasives," kans emerges in fallow and "patchy" spaces, a prototypically "feral" species thriving in landscapes disturbed by industrial change.[25] Unsurprisingly, Indian administrators and agriculturalists began to pay attention to the plant as the subcontinent was transformed by the encroaches of commercial and plantation agriculture.

When kans first appeared in the colonial literature, there was no mention of the tenacity that would soon characterize the plant. William Roxburgh, in his encyclopedic *Flora Indica*, was mostly struck by a plant whose wooly flowers gave it "a most conspicuous, gaudy appearance."[26] The crop was planted deliberately in the Serampore Botanical Gardens before the 1840s, listed unassumingly among other wild canes.[27] But kans was "discovered" at a moment when British administrators and botanists were seeing Indian landscapes in new terms of "improvement," and Indian plants were being "tropicalized" in their descriptions.[28] By the 1860s, kans had taken over twelve prime acres in Calcutta's Royal Botanical Gardens.[29] Superintendents borrowed a tactic from indigo planters reclaiming jungle land by laboriously burning the grass' roots before planting jute, *dhaincha*, sunn hemp, and *kenaf* to smother its remains. Without such efforts, districts across central and northern India were blighted by kans grass. One colonial administrator dryly noted that Etah district grew kans as its principal crop, while another noticed that a neighboring *pargana*'s villages had "relapsed into their original condition of sandy waste" on account of kans.[30]

Nowhere was kans' incursion more noticed than in the central Indian regions of Jhansi

and Bundelkhand.[31] The *Pioneer* reported regularly on kans' destruction. Jhansi's decay was a "blot on British administration," and kans an impetus "to face such outlay as may be necessary to restore its economical health." Its editors tied Jhansi's widespread peasant indebtedness to kans: as "cultivation and population [diminished] year by year" and virile draft animals were replaced by "small and weakly cattle, the "ruinous pest" went unchecked.[32] It was in also in Jhansi that agriculturalists piloted some of the first remedies for kans: one estate-owner smothered the "objectionable weed" with *jowar* [sorghum], and the land was liberated when the kans "caved in."[33] But Jhansi remained overrun, like Bundelkhand, where land was abandoned for years when kans took root.[34]

Agriculturalists and administrators described kans' eradication as theoretically possible, but unfeasible on account of cost. In the Himalayan Doon Valley, cereal production was nonexistent owing to the cost of the "deep hoeing for a long term of years" needed` to extirpate the weed.[35] Colonial parties even attributed non-horticultural woes to the grass' sinister character.[36] A hunting party was pursuing a jackal near Meerut when one member "brushed against a tuft of newly-out kans grass with such force as to cause his gun to discharge," killing another hunter. J.A. Voelcker's 1893 report on the state of Indian agriculture identified kans as one of the chief impediments to the reclamation of wastelands, even if the Central Province cultivator, he suspected, secretly "rejoiced in the remittance of his rent" when land went fallow on account of it.[37]

Nineteenth-century ecological transformations undoubtedly provided kans with disrupted landscapes to colonize. But the emergence of kans grass as a problem for colonial administrators was at least partially semantic, and in the closing decades of the nineteenth century, they wedded eradication to the promise of new agricultural technology. A first round of experimentation saw

steam engines tear up infested land on Allahabad's government farm; an enterprising district officer oversaw a similar project in the districts surrounding the southern Jumna river.[38] Yet steam plows were expensive, and improved bull-drawn operations offered more immediate relief. A Bundelkhand commissioner conducted experiments with imported plows "beyond the power of [Indian cattle]" before his transfer to Hoshangabad district, where "some of the most famous villages of the district had become almost a wilderness of kans."[39] The improved plow that he developed was soon brought to the Hoshangabad Government Experimental Farm for trials. But the commissioner was bearish about the Indian cultivator's uptake, since "the ryot who works with an eye to the future is an exceptional man," and he petitioned for the creation of a demonstration rig to showcase the technique to reluctant farmers.

As workers at the Coimbatore Experiment Station interbred kans with other sugarcanes to produce hearty commercial crops, researchers wondered if kans' tenacity might be put to use in arresting riverbank erosion or producing paper.[40] The staff of Nagpur's Agricultural Research Institute begged the viceroy to allocate greater resources to check kans' spread in the Central Provinces.[41] The Royal Commission on Agriculture declared that kans was only rivaled by poor irrigation as the major defect impeding Central Provinces agriculture.[42] The planting of sunn hemp to smother kans was tried again, and the Agricultural Department experimented with other plows as alternatives to the one piloted in Hoshangabad district.[43] Albert and Gabrielle Howard were vexed by kans upon their arrival at Indore's Institute of Plant Industry in 1924.[44] The American ridging plow they modified for Indian cattle was exhibited at the Poona Agricultural Exhibition in 1926, and a manufactured version sold to cultivators for fifty rupees. Meanwhile, one firm hawked a backpack flamethrower as a particularly dramatic eradication method.[45]

[**Possible place for image 1**]

The work of the Institute of Plant Industry was nearly entirely dedicated to kans eradication by the end of the 1920s, reaching a consensus that mechanization was the way forward.[46] In 1914, Joginder Singh, future agriculture minister in the Punjab Government, imported steam tractors to that province for kans work.[47] An agricultural show organized in Jubbulpore district showcased the possibilities of tractors throughout the region.[48] Soon after, the Department of Agriculture purchased three "international tractors," demonstrating their use to the owners of the fifty privately-owned tractors in the provinces.[49] The U.S. Bureau of Foreign and Domestic Commerce, alongside the State Department, urged American manufacturers to look to India, where kans grass presented a major possible market for their tractors.[50] Experiments continued to suggest the need to push mechanization in the fight against kans. One Imperial Council of Agricultural Research expert undertook a series of experiments to see whether a tractor "within the purchasing power of the larger land-holders [could] carry out the work as efficiently and as cheaply as manual labor."[51] Cumbersome "steam tackle" plows began to be used in kans-infested areas from 1935.[52] But these efforts did little to comfort the landlords and estate-owners who continued to contend with kans-smothered fields.[53] The manager of the Imperial Veterinary Research Institute in Izatnagar developed a new method for plow clearing followed by manual picking and the planting of sunn hemp. Yet even this method remained "beyond the means of the peasant farmer," and with independence on the horizon, he declared that state assistance was essential if free India were also to be free of kans.[54]

A survey conducted at independence borrowed from the Howards in asserting that, in India, still, "kans is king, and the cultivator is his subject."[55] Researchers at the Indian Veterinary Institute wondered whether kans might be harvested as a fodder crop for use in conditions of famine or scarcity.[56] But since the Bengal Famine, the project of land reclamation had gained

new urgency: increased food production could only be actualized through better utilization of cultivated land and the extension of cultivation to new areas. Since the 1920s, kans had been identified as a key factor impeding India's ability to grow foodgrains.[57] And as questions of food and welfare moved to the center of national planning, the connection grew more pronounced.[58]

Independent India's leadership wielded new confidence in its ability to manipulate lands and waters. But even before it was possible to invest in dams, Indian administrators, eager for success on the cheap, leveraged an unexpected source of heavy machinery to attack kans. In the closing days of the Second World War, several hundred tractors owned by the U.S. Army Corps of Engineers were lying moribund in Upper Assam, mothballed after completing the Ledo Road to Yunnan. An enterprising administrator in the Department of Agriculture, Daulat Ram Sethi, had approached General Raymond Wheeler to arrange for the transfer of surplus tractors to New Delhi.[59] Gathered in a depot on the outskirts of Delhi – "Sethi's Graveyard" – these repaired tractors formed the material basis for a new Central Tractor Organization. If government coffers were wanting, the new government in New Delhi had no shortage of entrepreneurial officers ready to bring new thinking to vexing problems.

By 1948, the CTO had 600 tractors ready for deployment. Its first operations had been on reclamation schemes in Bombay, the United Provinces, the Central Provinces, Bengal, and Rajasthan.[60] In the United Provinces, tractors cleared land for refugee settlement.[61] Ministers in New Delhi took note, and the March 1948 project in Sagar district comprised half of the CTO's big-scale debut, backed by major hopes from the central government; the other, in the United Provinces' Jhansi district, had begun three days prior in Mahroni *tehsil*.[62] [**Possible place for image 2**] There, representatives of an English tractor firm watched thirty vehicles tear into the first of a proposed ten thousand acres of infested land. The provincial government had offered

loans of food grains amounting to a normal year's production, and grants for the purchase of bullocks and implements for follow-up. It was unclear whether the tractor work had indeed eradicated kans grass, nor whether the cost of operating the machinery was any less than manual eradication efforts might have been. Yet the provincial government enthusiastically touted its success; In early 1949, India's agricultural ministers agreed that the reclamation of cultivatable wasteland was to be a central flank of the new "Grow More Food" campaign. [63] India's ministers set a goal of six million acres of reclaimed wasteland nationwide over seven years, suggesting that this work would yield a two-million-ton annual increase in food production.[64]

But tractors, loans, bullocks and implements represented a massive line item in a fragile national budget, and the World Bank's larger coffers soon beckoned. In September 1948, New Delhi had submitted a set of proposals to the International Bank for Reconstruction and Development — a proposal for the eradication of Kans grass among them.[65] Not long after the Conference of Agricultural Ministers, the IRBD sent a mission to India. Throughout the summer, Indian bureaucrats negotiated the loan. World Bank staffers framed the eradication of kans grass as one major step that India could take to reduce its annual grain imports. While concerned that the three million acres of kans-infested land already surveyed in central India was a fraction of the total, unknowable area, Bank staffers were enthusiastic about the CTO's early successes, and suggested that its operations might be more effective with the appointment of Americans or Europeans to key posts. Indian and Bank officials signed a loan agreement on September 29, 1949. Its terms gave $8,750,000 for the purchase of 345 tractors and related equipment for kans grass removal, and designated the remainder to the purchase of thirty tractors for jungle clearing in the Himalayan Terai. India would match these funds with $25 million of its own rupee and sterling resources.

As Indian bureaucrats set to work on domestic logistics, the World Bank trumpeted the loan overseas. President Eugene Black gave details to a ship full of bankers anchored off Nassau, describing an infested land "about the size of the State of Connecticut," and the promise of mechanical tractors for its reclamation.[66] In Washington, Bank staff were electrified by a developmental project of "unprecedented dimension, difficulty, and importance."[67] Raymond Wheeler returned to India in his new capacity as Engineering Adviser, coordinating with Daulat Ram Sethi, now the CTO's Chief Agronomist. Wheeler was awed by the audacity of underwriting "the largest tractor organization in Asia engaged in a single project."[68] *Science News Letter* told readers of a "great battle, with American heavy tractors, to free 3,000,000 acres of land from the strangle-hold of a gigantic weed-grass," likening the campaign against kans to the "American assault on the hedgerows of Normandy."[69] Yet if this were an advance, no one truly knew who was in charge: the plucky CTO under Daulat Ram Sethi, the Ministry of Agriculture and its tangled organizational structure, and the World Bank with its hopes of large-scale efficiency all seemed to be vying for control.

Far from the kans-infested fields of Central India, the World Bank set up shop in Delhi's Maidens Hotel in early 1950, sending equipment to the port of Bombay.[70] The tractors were American, but it was Great Britain's Labor Government which had designed the plow, initially for use in the infamous Tanganyika Groundnut Scheme.[71] From Bombay, workers shipped the equipment to a railhead sixty miles from the CTO camp, where two Indian and six foreign experts were put in charge of 150 Indian trainees. Soon, "these same young men were at the controls of an all-Indian caravan of thirty lumbering twenty-ton monsters, moving across the sixty miles to Bari, smashing their way through jungles and river beds when necessary, to avoid crushing bridges and culverts under their weight." On February 18, accompanied by a British

manufacturer's representative, Daulat Sethi issued a start order to the project lead, and the international campaign against Kans began. [**Possible place for image 3**]

As the tractors plowed, cheerleaders celebrated the campaign in national and international forums. Uttar Pradesh's Department of Agriculture and Animal Husbandry foregrounded the clearing of 15,000 acres in their account of provincial agriculture since independence.[72] The national Ministries of Food and Agriculture and Information and Broadcasting detailed the dispatch of tractors in high-profile publications, proclaiming the rejuvenation of districts in Uttar Pradesh, Madhya Bharat, and Bhopal.[73] K.M. Munshi, India's Food Minister, lauded the CTO's work at the Indian Council of Agricultural Research.[74] Two hundred eighty-two thousand acres of land were said to have been reclaimed from kans, and wheat yields on that land were significantly higher on that which had not been reclaimed.[75] The Madhya Bharat government declared its intension to set up three hundred-acre "model farms" on the reclaimed land to introduce the full promises of mechanized cultivation.[76]

Overseas, Eugene Black extolled the ongoing work in *World Affairs*, and the Public Affairs Institute featured the project in a report on the most promising projects for "aiding the underdeveloped two-thirds of the world to achieve both a much higher standard of living."[77] *Time* published its own report, and news travelled as far as Marthasville, Missouri, where the *Record* ran a picture of a gleaming plow ready to eviscerate a savage weed. The U.S. National Farmers Union held out the project as a landmark achievement of modern agriculture. Washington contributed personnel under the aegis of the Point IV program, sending a USDA weed specialist from Laramie, Wyoming to India to research chemical solutions to be used in the wake of mechanical eradication. He was followed by a USDA machinery expert to train Indian workers on farm machinery repair, and a filmmaker charged with producing a short on kans for

American audiences. These efforts provoked the ire of at least one American: in 1951, a right-wing economist described a land where farmers were soon to enjoy tens of millions of acres of soil freed from generations of blight. "What would we give in the good old US for soil like this?" he asked his readers in an incendiary pamphlet.[78] "These are our future competitors," he wrote of Central India's villagers, decrying the efforts of the Bank to assist far-off peasants, whose numbers would undoubtedly swell: "Will the Kans grass turn on the American worker?"

Reactionary broadsides aside, the soberer quantitative assessments of the project were promising. In 1948-49, the CTO reclaimed 71,497 acres, and the year afterwards, 79,346; during the first year of the World Bank loan, the CTO recorded 281,962 acres of reclaimed land.[79] By the end of 1952, Rafi Ahmed Kidwai, Minister of Food and Agriculture, declared that 720,870 acres had been reclaimed in total, exalting a large quantity of foodgrains wrought from the newly-reclaimed land. The following year, nearly a quarter million acres were reclaimed, bringing the total amount to around a million acres. Others, however, were less sanguine. India's Agricultural Policy Committee suggested that not enough work had been done to assess the root causes of infestation, nor the efficacy of different follow-up practices; it suggested the establishment of a Kans Research Station to investigate these matters systemically.[80] A lawsuit snaked its way up the Indian judiciary in response to a petition filed by cultivators whose land had been seized; the case would eventually reach the Supreme Court, where perplexed agronomists would be asked to produce decade-old surveys of kans-infested land.[81] One US Technical Cooperation Mission officer made note of the widespread resentment over the compulsory cost of kans eradication, and anxiety about the ways in which all field boundaries were pulled up before plowing.[82] Cultivators worried about the increased erosion ensuing in the monsoon, wondering whether kans had really been eradicated. Bank administrators declared the

project to be "meeting difficulties," with the clearance rates far lower than anticipated.[83]

The biggest challenge, however, was the question of maintenance. Indian technicians had bristled at foreigners overseeing operations and repairs.[84] "India will not gain," one American reporter cautioned, "by blinding itself to the simple fact that, as with all colonial areas in the world, when it was under empire rule it was compelled to remain the technological doldrums," warning the CTO to remain "bigger than politics," much as the American TVA appeared to be.[85] His warning was prescient: as early as March 1951, a parliamentarian from Madhya Pradesh brought up the poor maintenance alleged to be hampering the work, with expensive tractors lying idle.[86] These setbacks were compounded by a worry that the project had not sufficiently trained cultivators on important follow-up practices. Uttar Pradesh's Director of Agriculture urged states to train farmers in continuing eradication, lest "the vast sums spent on reclaiming or improving these lands will have been spent in vain." An American embassy official wondered if this neglect had undercut "the stupendous technological task of eradicating the germs of the grass for good." These concerns did not go unnoticed by the Government of India, nor the World Bank, who in July 1951 agreed to cancel 1.5 million dollars of the loan. Yet India's representatives were still hopeful that the World Bank could be persuaded to rethink the terms of its relationship with the tractor project. Later that year, Daulat Ram Sethi traveled to the U.S. to visit tractor manufacturers and to ask the World Bank whether they might consider financing the purchase of additional tractors should the extant models prove unrepairable.[87]

By the time Sethi arrived in the States, World Bank officials had already been dispatched to India to assess the progress of the battle against kans, which covered a range of land far greater than initial Indian surveys had suggested.[88] The technological shortcomings of the project were readily apparent: a lack of spare parts, fuel, and lubricant had led to poor operational

efficiency. But worse, an eagerness to make up time had led to "defective and uneven plowing," and disputes over land ownership had slowed progress to a crawl in many places. The hope of four million tons of marketable foodgrains annually had proven unduly optimistic, and the "cooperation of the State Governments" had been underwhelming. Unsurprisingly, in spite of Sethi's mission, the World Bank was unwilling to finance more tractors.

Dismayed but determined, the CTO continued to seek other national and international patrons who might assist the group in repairing its tractors. An expert from the Food and Agriculture Organization of the United Nations (FAO) arrived in India at the end of 1952 to develop modifications for the CTO's plows, harrows, and other equipment suited to Indian conditions. Yet confronted by an anemic budget, the government vetoed the contract that the expert had helped negotiate with Pashabhai Patel & Co. to manufacture this equipment for the CTO. Nine foreign workers were sent to India under FAO auspices in 1954, working at workshops in Lucknow, Bareilly, and Jhansi. But institutional energy was flagging: questions over whether New Delhi or state governments would be responsible for payments had never been resolved, and there were no clear plans for continuing the CTO's work after the loan's end.[89]

Publicly, the Bank cheered a resounding success. Eugene Black, in the pages of the *Rotarian*, described a recovering central India where, absent kans, "life has improved. Wheat and vegetables are again being grown. People have come back to their villages. New stores, and in some cases even branches of commercial banks, have been established. The pulse of life has quickened." Privately, however, officials were frustrated by both botanical and administrative challenges. Kans remained deeply-entrenched in a great deal of land, and officials chafed at their inability to train Indian workers to repair machinery, protracted internecine conflicts between Indian ministries, and underwhelming follow-up efforts. The weed's tenacity had been

predictable, but no one at the Bank had anticipated the formidable "administrative and bureaucratic obstacles standing in the way of plowing contiguous big areas of agricultural land."[90]

Yet far away from the Bank's headquarters, and in spite of internecine conflicts among its ranks, kans grass remained deeply entrenched in the soil of central India. Madhya Pradesh continued to promote the eradication of kans as one of the most pressing goals of its Five-Year Plan.[91] At the end of the first national Five-Year Plan, 1.17 million acres of land had been reclaimed by the CTO. Yet "on the whole," a review found, "land reclamation operations by Government tractor organisations were not found to be economic and in most cases at the end of the plan there were large areas awaiting recovery."[92] The Rockefeller Foundation, surveying its work on agriculture in 1957, bemoaned the continued presence of the "extremely noxious weed occupying thousands of acres in India." As late as 1969, a prominent Indian economist estimated that four million acres of land in Madhya Pradesh, Bihar, and Rajasthan remained out of cultivation owing to kans.[93] Yet as the CTO's offices shuttered, Indian agriculturalists and researchers were moving away from the notion that large tractors were the only way to eradicate the weed. As early as 1953, researchers were reanimating the notion that stronger fodder grasses like basket grass (*Oplismenus undulatifolius*), or the short-term irrigation and flooding of fields, could help "smother" kans.[94] The roar of tractors, however thrilling to planners and farmers who watched the lived promise of modernization with satisfaction, could not make up for lax implementation.

The Central Tractor Organization's slide into obscurity and its equipment's moldering – the CTO appears to have become moribund by the time the Green Revolution transformed Indian agriculture – was perhaps unsurprising. Many of the largest plans for agrarian uplift in the first

decade of independence – premised on dams, agricultural cooperatives, the remaking of citizenship or the very idioms of farming itself — met with failure as the bloom of postcolonial optimism yielded to the realities of Indian politics. But more striking is the rapid decline of kans as a perceived menace to India's agricultural capacities. Even as food production and agrarian uplift remained the aim of much development planning, and kans occasionally figured in analytical accounts of India's soil and its limits, the grass receded as a visible concern for administrators and politicians in the 1960s. Increasingly, when agronomists wrote of kans, it was as one of many biological threats, which, if irritating to the cultivator, had no greater resonance than any other, native or invasive.

The technical reasons for this decline are relatively straightforward. The development of cheaper, more agile tractors in the 1960s, alongside the revival of the long-maligned *bakhar* (blade hallow) plow, allowed for effective extirpation with relatively modest capital expenditure. Kans grass also proved readily susceptible to dalapon and glyphosate, the two groundbreaking herbicides of the 1970s, easily applied in field interrows or before planting a crop. To be sure, these technologies remained beyond the reach of most peasant cultivators, but were among the many new capacities available to wealthy producers. Moreover, these developments came as India's bureaucrats began to retreat from the idioms of centralized development planning: capitalists had waylaid India's plans for public-sector industrialization, the Planning Commission's influence was on the wane, and projects of agrarian development were coming to be wed to the particular farmer's individual uplift, rather than shared projects of state-driven improvement. The problem of kans, accordingly, moved from the legitimate purview of the state to a concern for individual farmers and their own capacities. This shift is evident in the matter-of-fact description of kans in contemporary Indian agricultural texts, described as a perennial

scourge of "rainy season pulses in Bundelkhand region of Uttar Pradesh and Madhya Pradesh" among other similar irritants, or as a weed found in fallow fields.[95]

But alongside kans grass' demotion to an ordinary scourge has come the concomitant assumption of a new role: an abundant, hearty crop ready for shoehorning into the service of different projects. Kans has been recently cast as a bioresource for the production of ethanol, and as a source of biomass for reducing sugars in chemical production. Elsewhere it has been promoted as a tool in revegetation and restoration programs, or as a source of rhizobacteria for cleaning up fly ash released by coal power.[96] The use of kans grass towards different agronomic and industrial ends harkens back to earlier projects, like paper fiber production or sugarcane breeding. Yet as landscapes have been transformed by new industrial realities – widening automobile ownership, anthropogenic climate change and landscape transformation, and coking for power – kans has been conscripted into roles befitting these altered ecologies. (Kans thrives in fire-blighted landscapes, and in Latin America and elsewhere, it has emerged as a bellwether species for identifying the proliferation of climate-change-induced wildfire.)

Wild sugarcane, like other plants, can become a menacing blight in one agropolitical moment, a weed suited to state intervention in the next, and a feral species suited to extreme ecologies in a subsequent era. This is not a plurality or plasticity specific to kans. Michael Dove has called attention to the "disciplining" of crops in the context of plantation production, showing how singular visions of plants are produced in conjunction with their alternatives.[97] Using the example of *Imperata cylindrica*, an invasive sword grass found on every continent where humans live and cultivate, Dove shows how the multivalent nature of certain weeds apparent to smallholders grew bound up in the paradigms of plantation ecologies of colonial Southeast Asia. States and plantation managers, he suggests, miss smallholders' contextual

accounts of species like *I. cylindrica*, as well as *S. spontaneum*, coding as an economic crop worthy of conservation in one context, and as a pest requiring eradication in another. By extension, as the trajectories of kans suggest, a plant may enter into the history of politics and economic life at one moment, cast in a singular role, only to have this role reshaped by the exigencies of the next. The qualities rendering a species "invasive" may be tangible, but also bound up in the rupture and disruption characterizing epochal shifts.

Recognizing the historical malleability of weeds in the South Asian context braids together disparate concerns of ecology and agrarian life. Twenty years ago, two prominent scholars of South Asian environments lamented the cleave between agrarian and environmental approaches to the region's pasts.[98] "Through a focus on natural resources," they wrote, "and the analytical presumption that these resources degrade because of human impact, the field of environmental studies has created a site for itself that is resolutely separated from the agrarian world." Invasive species and weeds which blithely transect the boundaries between forest and field suggest one way beyond a historiographic impasse that, if lessened, still divides environmental and agrarian histories of the region. But beyond the subcontinent, India's struggle with kans, inextricable from larger debates over political power and agriculture, shows how weeds are produced and recede in historical context and at moments of disruption. These species are not invented discursively, but do emerge in the disruptions of political change and take different form at other exigent moments. Tying agrarian and "wild" landscapes and our analyses of them together, they root particular ecologies in the lived dynamics of historical change.

**Benjamin Siegel** is a historian of South Asia and the author of *Hungry Nation: Food, Famine,*

*and the Making of Modern India* (Cambridge University Press, 2018).

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**Acknowledgments:** (Add if desired)

**Notes**

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[2] *India - Appraisal of the Agricultural Machinery Project* (The World Bank, September 22, 1949), World Bank Group Archives.

[3] On *malguzari*, see T.C.A. Raghavan, "Malguzars and Peasants: The Narmada Valley, 1860-1920," *Studies in History* 1, no. 2 (August 1985): 169–200; and Peter Harnetty, "The Landlords and the Raj: The Malguzars of the Central Provinces, 1861-1921," *Studies in History* 3, no. 2 (August 1987): 187–209.

[4] Different acts were passed owing to different jurisdiction within the Central Provinces; see *Agricultural Legislation in India*, vol. III (New Delhi: Government of India Press, 1952), xi-xii.

[5] This notion dates back at least to Ralph Waldo Emerson's 1963 lecture at Boston's Tremont Temple, where he spoke of a weed as a "plant whose virtues have not yet been discovered." George Washington Carver is credited, perhaps apocryphally, as having described a weed similarly as "a flower growing in the wrong place." See also one reflexive analysis of weeds and their definition in Janice Wegner, "A Weed by Any Other Name: Problems with Defining Weeds in Tropical Queensland," *Environment and History* 23, no. 4 (November 2017): 523–544.

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*History* 21, no. 1 (January 1, 2016): 100–124; and Andrew Baker, "Risk, Doubt, and the Biological Control of Southern Waters," *Environmental History* 24, no. 2 (April 2019): 327–350.

[8] On invasive species and historical agency, see Anna Tsing, "Others without History: Organisms as Agility-Shifting Actors in the Trajectory of Capital" (Austrian Academy of Sciences, October 17, 2016); influential in discussions of non-human agency is Timothy Mitchell, "Can the Mosquito Speak?," in *Rule of Experts Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 19–53.

[9] John McNeill, "The State of the Field of Environmental History," *Annual Review of Environment and Resources* 35, no. 1 (November 21, 2010): 345–374.

[10] This chronology broadly follows typology expressed in Mahesh Rangarajan, "Introduction: Issues in the Writing of Environmental History," in *Nature and Nation: Essays on Environmental History* (New Delhi: Permanent Black, 2015), 1–45. Other important reviews include Ramachandra Guha, "Writing Environmental History in India," *Studies in History* 9, no. 1 (February 1993): 119–129; Mahesh Rangarajan, "Environmental Histories of South Asia: A Review Essay," *Environment and History* 2, no. 2 (June 1996): 129–143; and Michael Fisher, *An Environmental History of India: From Earliest Times to the Twenty-First Century* (Cambridge: Cambridge University Press, 2018), 4-5.

[11] An important salvo was Ramachandra Guha and Madhav Gadgil, "State Forestry and Social Conflict in British India," *Past & Present* 123, no. 1 (May 1989): 141–177; this essay presaged Madhav Gadgil and Ramachandra Guha, *This Fissured Land: An Ecological History of India* (Delhi: Oxford Universty Press, 1992).

[12] David Arnold and Ramachandra Guha, eds., *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia* (Delhi: Oxford University Press, 1995); and Richard

Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860* (Cambridge: Cambridge University Press, 1995); and Vinita Damodaran, Richard Grove, and Satpal Sangwan, eds., *Nature and the Orient: The Environmental History of South and Southeast Asia* (New Delhi: Oxford University Press, 1998).

[13] A collection emblematic of this trend is Mahesh Rangarajan and K. Sivaramakrishnan, eds., *India's Environmental History: A Reader*, 2 vols. (Ranikhet: Permanent Black, 2012).

[14] Among a number of strong historiographic essays which have charted the shift from the woods to the water, see Camille Cole, "From Forest to Delta: Recent Themes in South Asian Environmental History," *South Asian History and Culture* 7, no. 2 (April 2, 2016): 208–219.

[15] Ramachandra Guha, *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya* (New Delhi: Oxford University Press, 1989); Michael Mann, "Ecological Change in North India: Deforestation and Agrarian Distress in the Ganga-Jamna Doab 1800-1850," *Environment and History* 1, no. 2 (1995): 201–220; and Marlène Buchy, *Teak and Arecanut: Colonial State, Forest and People in the Western Ghats, South India, 1800-1947* (Pondichéri: Institut francais de Pondichéry, 1996). From this scholarship, see Mahesh Rangarajan, *Fencing the Forest: Conservation and Ecological Change in India's Central Provinces, 1860-1914* (New Delhi: Oxford University Press, 1996); K. Sivaramakrishnan, *Modern Forests: Statemaking and Environmental Change in Colonial Eastern India* (Palo Alto: Stanford University Press, 1999); and Ajay Skaria, *Hybrid Histories: Forests, Frontiers, and Wildness in Western India* (New Delhi: Oxford University Press, 1999).

[16] Ajit Menon, "Colonial Constructions of 'Agrarian Fields' and 'Forests' in the Kolli Hills," *The Indian Economic & Social History Review* 41, no. 3 (July 2004): 315–337. To date, forests have remained central sites of investigation for studies of law, ecological change, and the impact of

industrialization. See Gunnel Cederlöf, "The Agency of the Colonial Subject: Claims and Rights in Forestlands in the Early Nineteenth-Century Nilgiris," *Studies in History* 21, no. 2 (September 2005): 247–269; Benjamin Weil, "Conservation, Exploitation, and Cultural Change in the Indian Forest Service, 1875-1927," *Environmental History* 11, no. 2 (2006): 319–343; and Pallavi V. Das, "Railway Fuel and Its Impact on the Forests in Colonial India: The Case of the Punjab, 1860–1884," *Modern Asian Studies* 47, no. 4 (2013): 1283–1309.

[17] The "water turn" might be said to have commenced with Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1995); and David Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (New York: W.W. Norton, 2007). Early Indian interventions include Amita Baviskar, *In the Belly of the River: Tribal Conflicts over Development in the Narmada Valley* (Delhi: Oxford University Press, 1995); and Christopher Hill, *River of Sorrow: Environment and Social Control in Riparian North India, 1770-1994* (Ann Arbor: Association for Asian Studies, 1997).

[18] The early 2000s saw a flourishing of work on waterways and hydrology; see Rohan D'souza, "Water in British India: The Making of a 'Colonial Hydrology,'" *History Compass* 4, no. 4 (2006): 621–628; Benjamin Weil, "The Rivers Come: Colonial Flood Control and Knowledge Systems in the Indus Basin, 1840s-1930s," *Environment and History* 12, no. 1 (2006): 3–29; and Daniel Klingensmith, *One Valley and a Thousand: Dams, Nationalism, and Development* (New Delhi: Oxford University Press, 2007).

[19] David Gilmartin, *Blood and Water: The Indus River Basin in Modern History* (Berkeley: University of California Press, 2016); Daniel Haines, *Rivers Divided: Indus Basin Waters in the Making of India and Pakistan* (Oxford: Oxford University Press, 2017); Sunil Amrith, *Unruly Waters: How Mountain Rivers and Monsoons Have Shaped South Asia's History* (London: Allen

Lane, 2018).

[20] Neeladri Bhattacharya, *The Great Agrarian Conquest* (Ranikhet: Permanent Black, 2019), 9 and *passim*. Earlier, Bhattacharya claimed that "the growth of environmental history has been accompanied [by] a decline of interest in agrarian history; the former, in fact, has defined itself in opposition to the latter." Neeladri Bhattacharya, "Introduction," *Studies in History* 14, no. 2 (August 1998): 165–171. On state power and agriculture generally, from a large literature, see David Arnold, "Agriculture and 'Improvement' in Early Colonial India: A Pre-History of Development," *Journal of Agrarian Change* 5, no. 4 (2005): 505–525; Subir Sinha, "Lineages of the Developmentalist State: Transnationality and Village India, 1900–1965," *Comparative Studies in Society and History* 50, no. 1 (2008): 57–90; Nicole Sackley, "The Village as Cold War Site: Experts, Development, and the History of Rural Reconstruction," *Journal of Global History* 6, no. 3 (2011): 481–504; and Harald Fischer-Tiné, "The YMCA and Low-Modernist Rural Development in South Asia, c.1922–1957," *Past & Present* 240, no. 1 (August 1, 2018): 193–234.

[21] See, for instance, Elizabeth Whitcombe, *Agrarian Conditions in North India, Uttar Pradesh: 1860-1900* (Berkeley: University of California Press, 1972); Christopher Baker, *An Indian Rural Economy, 1880-1955: The Tamilnad Countryside* (Oxford: Oxford University Press, 1984); David Ludden, *Peasant History in South India* (Princeton: Princeton University Press, 1985); Donald Attwood, *Raising Cane: The Political Economy of Sugar in Western India* (Boulder: Westview Press, 1992). David Ludden's account of agrarian South Asia conspicuously avoids discussion of India's environmental historiography, subsuming a brief mention of the "distinctiveness of hills, forests, and tribal environments" into a concern with how "capitalism and colonialism, like modernity and nationality, varied substantially across agrarian

environments." David Ludden, *An Agrarian History of South Asia*, The New Cambridge History of India 4 (Cambridge: Cambridge University Press, 1999), 246.

[22] These exceptions are, however, important ones. Early founding interventions in environmental history, including Donald Worster's *Dust Bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 1979) and William Cronon's *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983), were rooted in agricultural contexts. Recent surveys and introductory accounts of environmental history increasingly braid together the traditional domains of both agricultural and environmental concerns; see, for instance, J.R. McNeil's *Something New Under the Sun: An Environmental History of the Twentieth-Century World* (New York: W.W. Norton, 2001). The editors of *Agricultural History*, the *Agricultural History Review*, and *Environmental History* all regularly "cross over" into the other terrain. And new histories of science are attentive to the intersections of both environmental and agricultural history; see, for instance, Jeremy Vetter's *Field Life: Science in the American West during the Railroad Era* (Pittsburgh: University of Pittsburgh Press, 2016), and Stuart McCook's *States of Nature: Science, Agriculture, and Environment in the Spanish Caribbean, 1760-1940* (Austin: University of Texas Press, 2002). My thanks to the editors of *Environmental History* for pointing out many of these productive areas of convergence.

[23] Rohan Deb Roy, *Malarial Subjects: Empire, Medicine and Nonhumans in British India, 1820–1909* (New York: Cambridge University Press, 2017); Iftekhar Iqbal, "Fighting with a Weed: Water Hyacinth and the State in Colonial Bengal, c. 1910-1947," *Environment and History* 15, no. 1 (February 2009): 35–59;Natasha Nongbri, "'Plants out of Place': The 'Noxious Weeds' Eradication Campaign in Colonial South India," *The Indian Economic & Social History Review* 53, no. 3 (July 2016): 343–369.

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