Famines in India: Enduring Lessons

Tirthankar Roy

Professor of Economic History, London School of Economics and Political Science. Email: t.roy@lse.ac.uk

Keywords: famines, colonialism, colonial India, drought, Bengal famine, Deccan famines, environmental change

Famines in India: Enduring Lessons

Abstract

The end of the dryland famine around 1900 was of great significance in Indian history. Famine historiography, preoccupied with the Bengal famine of 1943 and absorbed with shortages of food, obscures why the dryland famine ended, and therefore, misreads why they happened in the first place. The paper suggests that the dryland famines were caused primarily by a shortage of moisture, and secondarily, a shortage of food. Uncoordinated interventions targeting water supply and wider access to water, roughly occurring between 1880 and 1930, played a significant role in their end. It draws the inference that drought-induced famines in India's past were not caused by food distribution failure, but water supply failure. The origin of droughts was rooted in the geography of peninsular India. As episodes of extreme dryness become more likely due to climate change, this history has relevance.

What is wrong with famine history?

Indian famine historiography is a well-developed scholarship. Famines are probably the most written part of modern Indian economic history. It is, however, a deeply unbalanced and biased scholarship. It is unbalanced in the following way.

The large-scale famines on which substantial documentary sources exist to serve the historian come in two blocks. The first block consists of the three drought-generated famines of the late nineteenth century, occurring in 1876, 1896, and 1898-99. All broke out in peninsular India, or the Deccan Plateau. The epicentre of the 1876-77 famine was the region earlier known as Madras-Deccan, consisting of Bellary and neighbouring districts. The epicentre of the 1896 and 1899 famines was western Maharashtra or the Deccan Traps region. After 1900, no more famines occurred in the Deccan.

The second block consists of the Bengal famine of 1943. The Bengal famine happened in the backdrop of the second world war. It is likely that without the war and without Bengal becoming the eastern front of the war after Japanese occupation of Burma, the famine might not have happened. It happened because of a diversion of food from public consumption to war consumption. So much is uncontroversial, though who was responsible for this diversion remains a point of controversy. Popular historians attack British Prime Minister Winston

Churchill's racist views about Indians for the diversion. Their critics believe that the more immediate and local factors were the more significant causes of the famine than what Churchill thought about Bengalis and Indians. The most important factor was the elected Bengal government's stubborn denial that there was a famine to score political points. Another factor was the breakdown of interregional trade for reasons not fully known. After all, there was little food shortage anywhere else in India, and Bengal was a part of India.[1]

Bengal in 1943, or one year in the history of one region in India, has attracted a great deal more writings on famines than any other episode in India's history. Indeed, the analysis of the Bengal famine has set the tone of the historiography of famines in India, even the world. If we exclude all government enquiry reports and concentrate on the interpretive scholarship, then works focused on the Deccan famines are very few. Of the studies available, we can exclude Tim Dyson and Arup Maharatna's research, being mainly about demography.[2] Mike Davis and B.M. Bhatia's works are better-known for their opinions than their analysis of the evidence.[3] They are also partial stories as they do not explain why the Deccan famines disappeared after 1900. That comment applies to David Hall-Matthews' work, though it is far more solid and original as scholarship.[4] That leaves us with one important book on the three Deccan famines, Michelle McAlpin's *Subject to Famines*.[5] Compared to this scholarship, the list of contributors to the Bengal scholarship is as long and as crowded as a telephone directory. They include contemporary analysts, present-day historians of famine, and authors who studied the famine in relation to Bengal history, its politics, communalism, and the effects of the war.[6]

The Bengal dominance of famine historiography is odd. The Deccan famines together cost 20-22 million lives. The Bengal famine cost one and a half to three million lives. If the Deccan mortality was ten times greater than that in Bengal, the number of pages written on Bengal is ten times greater than those written on the Deccan. But this is not just an imbalance in numbers. The obsession with the Bengal famine has sustained a misinterpretation of famine history, and in turn, of modern Indian history. The misreading occurs in two ways.

First, the Bengal story is about food. It is about the diversion of food. It is about a market failure or state failure to restore supplies and redistribute food. It was a war famine, and since humans fight wars, it was a manmade famine. Who had more agency in its making – Churchill or the civil supplies minister Hussain Suhrawardy – will continue to be debated. No matter, politics and colonialism take the centre in most analyses of the famine. To build a general 'theory' of famine based on war famines like Bengal's could amount to

oversimplifying the history and making the theory woolly and confused via the claim that all famines were 'manmade.'[7]

The Deccan famines were neither about food alone nor were they manmade in quite this sense. The 1899 famine, the Famine Commission of 1901 said, 'was a famine of water as well as of food.'[8] The three Deccan famine documents are filled with reports of a severe scarcity of drinking water, the problem of contaminated water, cholera outbreaks as a result, and people fleeing areas where no water remained. If food could be redistributed from surplus to deficit areas, water was fixed in space. At least in the countryside, there was no market for water. Market failure would not make sense in explaining this problem. Water became a problem because of a fall in underground and surface water level due to a failure of the monsoon rains. Politics, imperialism, and policy were not unimportant factors behind these famines. But the immediate cause for them was environmental – a climatic shock leading to pervasive water shortages. And knowing that should make for a better understanding of why politics mattered.

Bengal was one of India's few water-abundant areas, and water played almost no role in the famine. By overplaying Bengal, the famine scholarship loses sight of drought as a causative factor and projects famines as a food distribution problem. This claim is an error of interpretation.

Second, the field's Bengal fixation obscures the significance of famine history in India. The temptation is to turn that account into a comment on imperialism and draw, by implication, the inference that with the end of imperialism and emergence of democracy, famines would disappear. This is again an error. Famines had happened in the Indian drylands before European colonial rule began. Their end occurred during European colonial rule. Neither the origin nor the end can be easily attributed to colonialism, therefore. Colonial agency is a bad theory for another reason. Attributing famines to colonial rule begs the question why India's British rulers were so stupid to allow their taxpayers to die in millions. There were specific forms of intervention that worked to end these episodes. To know what these interventions were, we must ask why dryland famines happened. Politics will not provide an answer.

The significance of the end of famines in the Deccan was enormous. It transformed India's population growth trajectory. If one benchmark of modernization is living longer lives, India became modern because the great dryland famines ended. The transition had India-wide, even global, repercussions. It ushered in a demographic shift that significantly shaped the world's

population history, given India's size. As we can see from the smooth fitted line in Figure 1, which tracks the decade-wise average population growth rates, a transition of momentous significance started in 1900-1920. Since the censuses began, growth in one decade was almost completely neutralized by one of these Deccan famines in the next decade. That pattern ended effectively from 1900. The 1921 shock is a somewhat mysterious episode, and I will talk about it later. The very sharp drop in population happened in that year in the backdrop of the influenza pandemic and a devastating monsoon failure at the same time. There was probably a causal link between the two things, but we do not understand the exact relationship well.

The Bengal famine was a tragedy on an unprecedented scale, but for the region where it happened. It had little significance for either India at large or the world. Food ran scarce in many areas, but there was no famine anywhere else in India in 1943. The Punjab economy did very well in the same year that Bengal suffered this shock. Indeed, the Bengal scholarship does not represent the historiography of famines at all. It stems instead from a need to write about the trauma that beset mid-twentieth century Bengal. The 1943 famine was one factor in that trauma; the other factors were the Partition, forced migration, war, and communal riots. The history of the Bengal famine is not just a chapter in the history of famines. It is one part of a narrative of a very Bengali crisis.

To treat the Bengal famine scholarship as famine history, therefore, would be a mistake. That would entail oversight of drought risk and what causes a drought to become a mass killer. Drought risk is fundamental to the Indian environment. Therefore, the Bengal fixation leads to an oversight of how environmental factors influence growth and welfare. These conditions are not just about the past. Aridity and drought risk are not only present but likely to increase in India. Global warming makes 'deadly heatwaves the norm in India,' said the BBC in 2018.[9] To study droughts in the past is to use the past to understand the future better. Does that past have valuable lessons for the future?

I am going to suggest that it does. Dryland famines disappeared thanks to increased supply and more egalitarian distribution of water. But that achievement could not have come without a price. South Asia at large, and peninsular India in particular, is not one of the water-abundant areas of the world, unlike Western Europe, North America, Japan, and much of China. It is a water-scarce region overall. The exploitable stock is much smaller per head than in some of these other regions. So, to change supply or change distribution could not happen

without putting enormous pressure on the environment, even as it was a profoundly welfare-enhancing change.

If indeed droughts were a structural feature of Indian geography, why start with 1876? Why not write a continuous narrative beginning with the deep past? The difficulty is that the sources on famines before the nineteenth century are not comparable with sources available for times after. This difference is quite a critical one. One of the most decisive changes in the late-nineteenth century was the accumulation of novel kinds of information and knowledge, for which there was no precedence before.

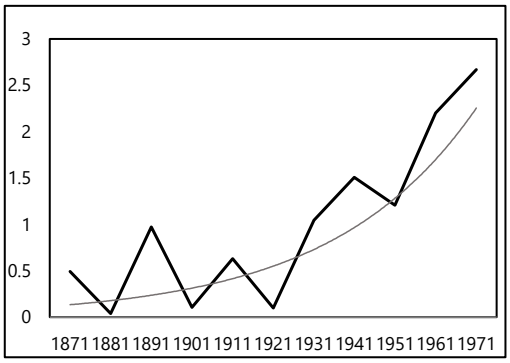

Figure 1. Population transition

Average population growth rate (% per year per decade) with a trend line added (source: Censuses of India).

How do we know what we know about Indian famines?

Precolonial droughts did not generate systematic data. Our knowledge of famines for periods before 1770 comes from hagiographies about rulers, travelogues, and manuals on statecraft written by Brahmin priests. Works like Ziauddin Barni's account of fourteenth-century North India (Tarik-i-Firuzshahi), or Khwaja Nizamuddin Ahmed Bakshi's Tabaqat-i-Akbari on Gujarat around 1575, or Ibn Battuta's on the 1335 seven-year famine near Delhi, are examples of sponsored histories or travelogues. The several volumes of Dharmashastra compiled by P.V. Kane contain many references to famines, such as the statement that 'if a *srotriya* [a learned Brahmin] perishes through hunger in the domains of a king, that country

Formatted: Font: Italic

would suffer from famine.'[10] The hagiographies share certain features. They deal with the response to famines more than the causes. At least a well-articulated theory of causation does not emerge from these writings. This is to be expected where an official historian has a job to extol the king's virtues. Dharmashastra references likewise are focused on the Brahmin priests, and the statements are usually normative than factual.

To think that these sources could be used to construct a historical narrative would be making a mistake. B.M. Bhatia, for example, estimates that 'in the earlier times a major famine occurred once every 50 years,' whereas 'between 1860 and 1908, famine or scarcity prevailed in .. twenty out of the total of forty-nine years.'[11] This statement says that 'in the earlier times' hagiographies were written once in 50 years, not that famines occurred once in 50 years. Similarly, Mike Davis cites H.H. Khondker – who seems unaware of the problem of comparing episodes in the long run – to make the doubtful, possibly absurd, at any rate unverifiable claim that precolonial India practiced 'humanitarian .. tradition of dignified relief.'[12] Generalizations like these are unsound as evidence-based history.

From the 1770 Bengal famine onwards, the nature of the sources began to change, though it is only after 1876 that the change became apparent. The 1770 famine produced minimal systematic data collected by the government because there was nothing like a proper government in control of Bengal then. The British East India Company ran the fiscal administration. The Nawab Nazim ran the civil administration. The state's two arms distrusted one another, did not act in coordination, and did not exchange information. Based on the little official data that exist and some private accounts, it is hard to say which one of the three proximate causes – a drought in western Bengal, warfare, and the dysfunctional government – was more responsible for the famine. A north Indian famine in 1783, for similar reasons, remains insufficiently explained.

For nearly a century after this episode, famines occurred in smaller regions: Guntur, Kathiawar, Sind, Colaba, or Orissa. These episodes engaged the government, then mainly British Indian provinces, and led to more in-depth reporting and documentation. Again, these were limited and localized efforts. While the scale of the data collection expanded steadily, there was not yet a serious attempt at building a theory of famines to serve as the basis of state policy.

That changed with the Deccan famines of the late nineteenth century. These episodes led to extensive data collection. Much of that data was collected in the form of fact-finding

enquiries conducted in the districts. Hundreds of people gathered these reports, making it very unlikely that the documents could reflect a single viewpoint or opinion. When compiled, these reports formed several thousand pages of documents, enough information to build a theory of causation of dryland famines. The theory, it was hoped, would generate a scientific policy or rules of response.

What was that theory?

The theory of dryland famines

Some of the best descriptions of a dryland famine are available in non-official writings from the 1870s. In 1877, a British journalist called William Digby moved to India to take over as the editor of the *Madras Times*. His first task was to cover the famine then raging in the districts about 200 miles to the west of Madras town. He toured, wrote down what he saw, and campaigned for public charity. What he saw was not just hunger, something charity might help with. He saw a desperate search for moisture everywhere, something no charity or public funds could solve. Grim villagers 'excavated .. failing wells deeper and deeper in the rocky strata.' They 'delved for springs and under-currents of water in the sandy beds of the dry river.'[13] They dropped a bucket in a nearly dry well at nightfall, hoping the morning would see a little muddy liquid accumulate in it. He saw 'universal drying-up of the tanks' (artificial lakes) on a scale 'hardly been witnessed within the memory of living man.' [14] Digby followed up his famine report with the work he is most known for, *Prosperous British India*, a scathing book arguing that India's poverty and famine resulted from the failure of British colonial rule, among other ways to provide water when the rains failed.[15]

In a different way, an official commission of inquiry delivered the same conclusion. The theory that emerged from the 1880 Famine Commission and the almost contemporary Irrigation Commission reports had two parts to it. The first part said that India's tropical monsoon climate made droughts more likely than temperate climates. The second part said that water shortage caused food shortage.

What is the tropical monsoon climate? The two-part chart (Figure 2) answers the question. The left part of the chart compares a tropical monsoon city like Delhi with a temperate zone city like London on a monthly maximum temperature. The right part compares them on monthly precipitation. Delhi is a significantly hotter place and would be a desert but for the monsoon. The two cities receive roughly similar rainfall quantities in a year, but the

distribution of that rain is even through the year in London and concentrated in a few months in Delhi. None of that is new information to the *Weekly*'s readers, but one inference that follows from this comparison can still surprise. The extreme heat of the tropics causes a high evaporation rate of surface water. If the strength of the monsoon is weaker in one year, the heat takes over. The longer-than-normal period of dryness will reduce surface water significantly and reduce the groundwater recharge potential. That is what drought means, and this is what makes it a dangerous condition.

Almost every known famine in India before 1900 started because of a failure of rains in this way. 1876-77 was the driest year in over a century for which rainfall data exists. The average rainfall was 30 percent short of the long-term level. Almost similar levels of shortfall happened in 1896, 1899, also in 1918. Only one drought year in post-independence India, 1972, saw a 25-30 percent shortfall. Rainfall deficit of somewhat smaller scale had happened in many regions before, including in 1942 in Bengal. And these episodes did have the capacity to cause local famines. Between 1900 and 1947, such shortfalls, 15-25 percent, occurred on at least four occasions, not ordinarily leading to famines. This change is what I call the *disappearance* of dryland famines.

The second part of the theory said that a famine was, by definition, an acute food shortage. How do we know that there is a food shortage? In the open market in the area where the famine broke out, grain would sell for maybe 300 or 400 percent of the average price. If transport costs were high, grain would be available in more distant markets that did not suffer the drought at far lower prices than that.

When taken together, the two parts suggested that food shortages happened *because of* water shortages. That water should be the target of preventative action, whereas food should be the target of mitigating action. In this fashion, the two-part theory led to a series of response rules, if not exactly a policy in the modern sense. The state should set up relief camps where food would be exchanged for work. The state should sponsor irrigation canals to promote multiple cropping and make sure that there was enough water in winter or dry months. And it should build railways to distribute food faster and in bulk from cheaper distant markets to dearer local ones. Finally, the 1880 Commission recommended the establishment of a statistical data system to monitor conditions. A department of agriculture was created, which would collect data on weather and crops.

Did this recipe work? Did the Deccan famines disappear because this recipe worked? The most important research monograph on dryland famines said that it did work; the part that worked was the railways reducing transport cost of food, which is why dryland famines disappeared. In complete contrast with the Bengal famine consensus, markets, according to McAlpin, were not an area of failure, but markets were an area of success. New communication and trading infrastructure strengthened markets. Food did move around faster and in greater bulk in peninsular India than before.

McAlpin's book was badly timed. While it received positive reviews in international journals, in India, it was brutally trolled. Nationalistic economic history was the orthodoxy in India, and suggestions that British colonial rule might cause some improvement somewhere invited scorn.[16] Recent statistical work has revisited the subject and confirmed McAlpin's claim that the railways and cheaper carriage of food made droughts less deadly than before.[17]

I do not accept this result in its entirety. Railways did help. But they could not be the critical factor because a railway-focused explanation overlooks the problem of water. Between 1876 and 1896, there was considerable expansion of the metre-gauge railway system. Indeed, route miles more than doubled between 1876 and 1899, much of that expansion in the Deccan.[18] Average fares fell, and tons of goods carried per mile increased at the same time. At the end of twenty years of robust growth in infrastructure, two famines broke out in the same region where a lot of this enterprise concentrated. These were the two Deccan famines of 1896 and 1898, mentioned earlier in the paper. Anybody could see that the railways were a necessary but not a sufficient means to mitigate the drought effect.

Many officers and local reporters hinted exactly at the same thing, that the official policy was only half right.

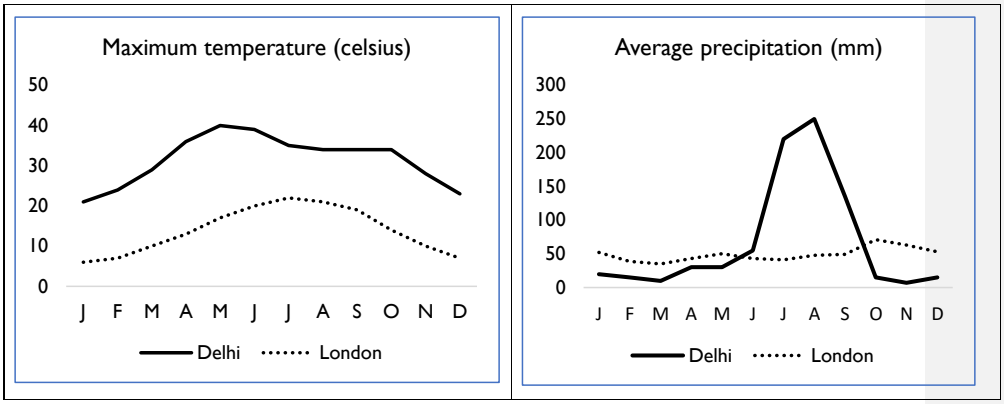

Figure 2. Temperate and tropical-monsoon cities compared

Revising the theory

Why was it half right? Famines did start from water shortage, but canals, the mainstay of official policy, were not going to work in the Trap area. Canals worked if there were perennial water bodies from which canals could be taken. That condition existed in northern India, where the Himalayan snowmelt fed the rivers. The Deccan rivers did not receive snowmelt and dried up in the dry months. Most rivers in the Plateau, even the mighty Krishna, Godavari, Bheema, and Tungabhadra, became almost dry during droughts like the 1890s ones. The only local solution to water shortage here was to dig wells or build tanks (manmade lakes). Again, bad droughts would dry up tanks. And wells were expensive to build because water occurred in fissures between hard rock layers. Wells were, therefore, a rare asset owned by the rich or the elite in the countryside. During long-lasting droughts, underground water fell in volume, and digging a new well was more expensive and uncertain than usual. The Deccan countryside in the early twentieth century was full of half-constructed wells that had been given up. Even when underground water did survive, it would not necessarily help. For, wells were private property.

There are many references to the fact that the 1890s drought, which lasted several years, affected lives and livelihoods by greatly reducing the quantity of surface water, and in extreme cases, reducing the recharge of groundwater in the Deccan Trap region. For example, several successive years of relative dryness had caused almost 'total disappearance of a huge volume of subterranean water all over the Deccan.'[19] 'The famine,' declared the 1901 Famine Commission, 'was a famine of water.'[20] The disappearance of drinking water pushed people

out of the countryside on a large scale: 'you may see whole villages deserted because of the exhaustion of the water supply.'[21] And as a slightly later report on a period of dryness in Baroda said, 'The shortage of drinking water is one of the most grievous effects of a drought, that is naturally more dreaded than a failure of food crops'[22] Water shortage was 'more dreaded' because neither the government nor the community knew how to deal with a water shortage. Food shortages technically had a solution, reduce the costs of transporting food. Water was a much trickier problem to solve.

If we define a secure source as one that could withstand severe dryness, then secure water access was a private good, from the temple tank to the homestead well. The law protected private property. Further, there was a strong prejudice against sharing of water. The access to the wells was ritually segregated. The Brahmins could take water from almost anywhere, whereas the so-called untouchables or depressed castes had a moral duty not to take water from the same wells. Access to temple tanks was necessarily reserved in this way.

Since the colonial rule was committed to protecting private property and avoiding interference in religious prejudice, the message going out to the local officers was not to alter access by force and upset the social order. The result was disastrous in 1876: the 'humble castes and classes of field labourers .. rude artisans and .. village menials' were the greatest sufferers from the calamity.[23] The caste bias in mortality persisted into the 1890s famines: 'as to the 'caste' of those died, by far the great majority are 'Hindus of low caste'.'[24] Much of that mortality was because most depressed-caste people ordinarily lived on surface water, did not possess secure masonry wells, and surface water had almost disappeared.

Surface water was not only reduced in volume, but the little of it that was left was also highly contaminated, and most livestock and people shared those sources. Dependence on surface water, therefore, led to waves of cholera outbreak. Famine demography scholarship tells us that many people died in the late nineteenth century, not from malnutrition but from disease. One of the largest killers was cholera, not a native disease in the Deccan. Cholera had a very direct association with water quality, and the quality of water worsened everywhere.

Whether the officers liked it or not, and whether they had the legal sanction or not, the new knowledge seeped into famine relief effort and the discourse on famine relief in several ways.

What ended dryland famines: State, society, politics, and technology

In official policy, the conventional relief operation, the food for work programmes, continued. However, most relief camps started by digging a well and then designing water usage in a carefully caste-segregated way. Although officers pussyfooted around prejudice, the Trap area's relief operations did leave a legacy in the shape of wells for public use. The scale of the relief operation suggests that wells were built on a substantial scale.

Further, local officers broke the rule of non-interference in private property in many areas. They did something unthinkable in normal times, requisition of wells. This was the first time that the principle of public trust in groundwater found a sanction if an implicit one. It took another 100 years for the principle to be recognized by the Supreme Court of India. What happened around 1899 was a subtle shift in the famine discourse, so subtle that it has escaped famine historians' attention. Within twenty years, the language of famine relief departed from the fixation with canals and railways – the tools to mitigate food shortages – towards water and sanitation or the tools to control cholera (Table 1). The sanitation engineers requisitioned many private wells to disinfect these, often against considerable resistance.

Despite this record, we cannot explain the disappearance of the famines with state effort alone. As I said, in the end the state was too timid an agent to upset caste-based privileges in the countryside. The local officers were, in the normal times, a constrained agent. Their job was to protect private property, even when the water that the private well drew on was common property, and even when human rights demanded that everybody should have equal access to what water was available.

Within a decade after the last great Deccan famine, an uncoordinated social movement emerged in the Trap area of western Maharashtra to challenge the moral rule that prohibited untouchables from accessing water bodies with ritually sanctioned rights. Such actions appeared in colonial Madras and northern India too in a weaker form. Not by accident, there was a significant concentration of these movements in the Trap area. The movement took the form of numerous attempts to capture manmade tanks and wells by force. The most famous of these movements was the Mahad Satyagraha (1927-1931). Many more were recorded by the *Times of India* reporters and by B.R. Ambedkar in his later writings. Since the administration and the police often took the side of the tanks' existing controllers, several of these cases went to court. Offence to religion being a criminal act, the judges found it difficult to settle cases like these. However, after the victory of Mahad in the courtroom, a pattern had been established.

From late in the interwar period, politics joined in these efforts. Volunteers affiliated with either the Harijan Sevak Sangh or other groups tried to mediate in water-capture conflicts. The provincial legislature then passed directions and new laws about opening access. Seminars and conferences were held in the big cities on how far social equality was achieved in access to public goods. A climate of awareness of water-deprivation by caste had been created, not by coincidence in the same region where a generation ago, the official reporters had shown how caste-biased famine deaths had been.

What did this movement achieve? Nothing very dramatic in terms of widening access to temple lakes or private wells. Private property and segregation persisted in the countryside. Often, attempts to capture water generated fierce and violent backlash. Sometimes, state effort to build wells and then deliver the right to its use to the depressed castes created more problems than it solved. After independence, many such wells were constructed out of the community development programme funds. Reservation of access to well water perpetuated segregation. Caste was a moving target, and the depressed castes practiced segregation amongst themselves. No wonder that many late-twentieth-century studies on caste-based access to public goods in the countryside paint a dismal picture.[25]

But something did change. As I said before, segregation in water access rested on a moral rule which made sharing of water a sin, a two-sided command that made it an impure act for the upper castes to share water with others, and an offence for the untouchables to share water reserved for the upper castes. Ambedkar's writings, which argued that annihilation of caste was so difficult because of a link between caste and sacredness, attacked this two-sided right: 'The Untouchable does not want water. What he wants is *the right* to draw water from a common well.'[26] The courtrooms and these uncoordinated protest movements made this demand more rightful and sustainable in the interwar period. Ritual segregation after that rested on brute force rather than on rules of accepted rules of conduct. This was a significant transformation in the making of modern India. Indian society, Louise Dumont said, rested on a 'single true principle, namely the opposition of the pure and the impure.'[27] We may debate whether he generalized too far. Nonetheless, this opposition was beginning to fade away.

Something else changed too to improve security, increased supply, and wide~~n~~r access. Canal water in the north and southeast, we now know, was relatively egalitarian in that it did not usually go to the upper castes. The port cities and several interior cities developed extensive waterworks based on impounding monsoon water and redistributing it in pipes. The supply of such water was for long restricted to the rich, but not necessarily the upper castes. And as it

expanded, it also democratized water access. Piped water greatly strengthened the water security in the cities and widened access across castes. Piped water did not necessarily make the cities healthier places as a result. The opposite was the case. Between 1872 and 1881, the Bombay Presidency's population was almost constant at 23 million because of the famine, but Bombay city's population grew 20 percent because of greater water security. The city became a magnet for migrants fleeing the food and water-scarce interior. In the next famine decade, 1891-1901, both the city's and the Presidency's population fell by six percent. The reason was, again, food and water scarcity in the countryside. Bombay was not food and water scarce anymore, but the population had grown so much that the urban slums were a hotbed of disease. A plague outbreak in these areas killed hundreds of thousands of people.

Law was a limited agent behind the democratization of access, as I mentioned before. But legislation did kick in from time to time. With surface water, the Indian Easements Act (1882) could address some problems of access locally. The eminent domain principle was invoked in some provinces in the late colonial times to assert open access to large surface water bodies. The post-independence dam-building projects built on that precedence.

The total effect of wells, canals, urban waterworks was a rise in the supply of per capita water available in the long run. The best measures that we can have for this change suggest that per capita access was growing quite significantly in colonial times, and the growth persisted. It accelerated in the more recent decades after India's economic reforms because borewells became more affordable. I should add here that per capita water access was nowhere near the levels achieved in contemporary western Europe, North America, or the developed parts of East Asia despite the change. South Asia was just too water-scarce to push levels of consumption that far. Still, the rise in the level of consumption was a catalyst in the end of drought-generated famines.

That hugely welfare-enhancing move came with a cost. A big obstacle to effective intervention in earlier times, as I show, was that wells were a private property in the main, whereas underground water was, in theory, a common property. In the long run, if we factor in the second half of the twentieth century into this story of water access, the problem remained. Legal access rights did not change very much. The public trust doctrine, first practiced during the 1890s famines, did take firmer hold but without adequate enforcement infrastructure.

On the other hand, the colonial model of surface water usage was extended greatly after 1947. The model entailed building dams to impound monsoon water and draw canals to redistribute water over a wide area. That policy, extended into peninsular India's vulnerable environment, often imposed considerable environmental and social costs. Because of these costs and intervention failure, water usage has relied more on the less politically sensitive groundwater in recent decades. The successive waves of the green revolution and urbanization heavily used groundwater and placed enormous pressure on that resource.

This whole story, then, looks like a cross (Figure 3). While per capita water use increased, the level of exploitable water available for use was reduced. In recent centuries, most societies should show a similar pattern, except that the steep fall in availability in South Asia is unusual and worrying. The earlier phase of the rise in per capita water use led to the end of the dryland famine, and the later phase of the rise is associated with the green revolution, urbanization, industrial use, and an environmental disaster in the making.

Table 1. The occurrence of words every 100 pages in three Famine Commission Reports

	1880	1898	1901
irrigation	126	69	18
railway	23	19	3
cholera	2	8	18

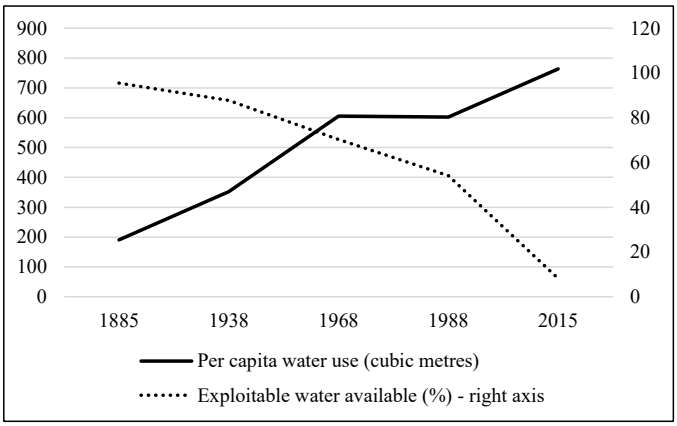

Figure 3. The water cross (India).

Note: On data, sources, and method, see Tirthankar Roy, 'Water, Climate and the Economy in India from 1850 to the Present,' *Journal of Interdisciplinary History*, 11(4), 2021, 565-594.

Conclusion

The end of the dryland famine created modern India. Too much focus on the Bengal famine of 1943 obscures that fact, leading to an unbalanced and overly simplified general theory of famines, ~~leading~~and to an insufficient understanding of the interventions that ended the dryland famine. The end did not just owe to one thing. Food shortages and their lessening did work, but that was not enough. The dryland famine was not about food. It was about water primarily. The food distribution infrastructure was of little use in preventing, even mitigating, a water famine.

What worked, then? The paper answers that a series of uncoordinated interventions targeting water supply and equality of access began to have an effect from 1900. The famine relief effort and the assertion of the public trust in water ~~was~~ were ~~a~~ part*s* of this, often confused and contradictory, package. Other parts were social movements, law and the courts, provincial politics, irrigation projects, and urban water supply systems. All of that combined to play a part in increasing supply and in democratising access to water. But there was a price to be paid for that achievement, in the shape of deepening environmental stress. This is the enduring lesson of famine history, the part of famine history that lives with us.

[This is the revised text of the D.D. Kosambi memorial lecture organized by the Department of History, Ramnarayan Ruia College, Mumbai, in March 2021. I am grateful to the organizers for giving me the chance to present this work. I warmly thank the audience, who asked many penetrating questions that helped me revise the text. Email: t.roy@lse.ac.uk]

Notes

[1] On this difference, see Roy, Tirthankar (2019), 'The Great Bengal Famine: Is there One Story to Tell?' *History Today*, 69(7), 48-53.

[2] Dyson, Tim (2018), *A Population History of India: From the First Modern People to the Present Day*, Oxford: Oxford University Press; Maharatna, Arup (1996), *The Demography of Famines: Indian Historical Perspective*, Delhi: Oxford University Press.

[3] Davis, Mike (2000), *Late Victorian Holocausts*, New York: Verso; Bhatia, B.M. (1991) *Famines in India*, Third Edition, Delhi: Konark [first edition, 1963].

[4] Hall-Matthews, David (2005), *Peasants, Famine and the State in Colonial Western India*, Basingstoke: Palgrave.

[5] McAlpin, Michelle (1983), *Subject to Famine: Food Crises and Economic Change in Western India, 1860-1920*, Princeton: Princeton University Press.

[6] Contemporaries include Tarakchandra Das, Manilal Nanavati, and P.C. Mahalanobis; later scholars include Amartya Sen, Mark Tauger, Peter Bowbrick, Cormac Ó Gráda, Mufakharul Islam, Lance Brennan, Madhusree Mukherjee, Sugata Bose, Richard Stevenson, Omkar Goswami, Auriol Law-Smith, Deepak R. Basu, Janam Mukherjee, and Paul Greenough. If we include those who studied the famine in relation to Bengal history, communalism, demography or the second world war, then the list also contains Partha Chatterjee, Claude Markovits, Iftekhar Iqbal, Indivar Kamtekar, Kaushik Roy, Tim Dyson, Arup Maharatna, Rakesh Batabyal, and Utsa Patnaik. This is not a complete list.

[7] An example of such oversimplified narratives is Alex de Waal's book *Mass Starvation*, which takes the equation between famine and food for granted, overlooks geographical complexities, and attributes tropical famines to 'imperialism,' whatever ~~the term~~'empire' means and the connecting link between empire and famine might be ~~means~~, *Mass Starvation: The History and Future of Famine*, Cambridge: Polity Press, 2017.

[8] India, *Report of the Indian Famine Commission, 1901* (1901), Calcutta: Government Press, 61

[9] BBC report, 25 October 2018, https://www.bbc.co.uk/news/world-asia-india-45949323 (accessed 12 August 2020).

[10] Manu, cited in Kane, P.V. (1941), *History of Dharmaśāstra*, Poona: Bhandarkar Oriental Research Institute, vol. 2, Part 1, 171.

[11] Bhatia, *Famines in India*, 7.

[12] Khondker, H.H. (1986), 'Famine Policies in Pre-British India and the Question of Moral Economy,' *South Asia*, 8(1), 25-40; Davis, *Late Victorian Holocausts*, 167.

[13] Digby, William (1878), *The Famine Campaign in Southern India*, London: Longmans Green, vol. 1 of 2, 70.

[14] Ibid., 69.

[15] Digby, William (1901), *Prosperous British India. A Revelation from Official Data*, London: T. Fisher Unwin.

Formatted: Font: Italic

[16] Rangasami, Amrita (1984), 'The McAlpin Capers,' *Economic and Political Weekly*, 19(35), 1524-28.

[17] Burgess, Robin and Dave Donaldson (2010), 'Can Openness Mitigate the Effects of Weather Shocks? Evidence from India's Famine Era,' *American Economic Review*, 100(2), 449-453.

[18] Bogart, Dan and Latika Chaudhary (2015), 'Railways in Colonial India: An Economic Achievement?' in Latika Chaudhary, Bishnupriya Gupta, Tirthankar Roy and Anand V. Swamy, *A New Economic History of Colonial India*, Abingdon and New York: Routledge, 140-160.

[19] India (1902), *Papers Regarding the Famine and the Relief Operations in India during 1900-1902*, London: Her Majesty's Stationary Office, 263.

[20] India (1901), *Report of the Indian Famine Commission, 1901*, Calcutta: Government Press, 61.

[21] 'The Famine in India: Nasik District,' *Times of India,* 20 February 1900

[22] Baroda (1913), *Report of Famine Operations in the Baroda State 1911-12*, Bombay: Times of India Press, 22.

[23] Richard Temple, cited in Chiplonkar, S.H. ed. (1878), *Quarterly Journal of the Poona Sarvajanik Society*, Poona, 7.

[24] India (1902), *Papers Regarding the Famine*, 28.

[25] Thorat, Sukhadeo (2002), 'Oppression and Denial: Dalit Discrimination in the 1990s,' *Economic and Political Weekly*, 37(6), 572-578.

[26] Ambedkar, B.R. (1989) 'Gandhi and His Fast' (1932), *Writings and Speeches, vol. 5*, New Delhi: Government Press, 329-395, emphasis added. The cited text appears on p. 373.

[27] Dumont, Louis (1970), *Homo Hierarchicus: The Caste System and its Implications*, Chicago and London: University of Chicago Press, 43.