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‘Your Foreign Plants are Very Delicate’: Peasant Crop Ecologies and the Subversion of Colonial Cotton Designs in Dharwar, Western India, 1830–1880

Sandip Hazareesingh

Introduction

As in other cotton-growing agrarian environments colonised by Europeans,¹ the onset of British colonial rule in rural western India was accompanied by pressures on local peasants to adopt and cultivate new foreign varieties of cotton so as to transform the species into one of the main commodities for the export market. Moreover, the potential of raw cotton to generate high land revenue assessments in western India was held to be considerable; indeed, the entire structure of colonial rule at local rural level was organised around the levy and collection of land revenue, which comprised the colonial state’s primary source of income.² In 1835, revenue officials of the Government of Bombay, anxious to find out why the *raiya*s (peasant cultivators) of the district of Dharwar had not taken advantage of opportunities to grow ‘superior’, allegedly more profitable, foreign (mainly American) cottons, in preference to their ‘country cotton’, sent out local *mamlatdars* (junior indigenous revenue officials) to each *taluka* (district administrative sub-division) to investigate the possible reasons. The responses of the peasants articulated their understandings of the social and ecological dynamics that lay at the heart of their farming practices.

The foreign cottons, they asserted, were ‘very delicate’: once sown, they took longer to come to maturity and were more vulnerable to

adverse weather conditions. This prolonged soil occupancy put 'enormous pressure' on the cultivators' subsistence livelihoods, interfering in particular with jowar (millet) food cultivation, whose variety of produce and quicker rates of maturity during the agricultural year became much harder to sustain. In addition, the extended presence of the foreign cottons hampered the customary grazing of cattle in the fields during the month prior to the arrival of the south-west monsoon. As the peasants had to prioritise the well-being of their animals, these cotton plants were often sacrificed and ended up destroyed. Moreover, their seeds were more brittle than those of the local indigenous Kumta cotton, and the womenfolk of their families found them virtually impossible to clean using the habitual foot roller. The seeds ended up smashed and mixed up with the staple during the ginning (cleaning) process. Nor were the peasants convinced by promises of greater profits to be made from the 'exotic' cottons, as these required watering and constant attending to, as well as separate gathering, all of which involved higher labour and other production costs compared to Kumta cultivation. They pointed out that they always did well from the indigenous variety, as even in bad years when harvests were down, cotton prices went up, thus ensuring good returns.³

In thus responding to a query about a single crop, cotton, the peasants were at pains to define, more holistically, the priorities of their everyday livelihoods centred on the production of food. Moreover, they implicitly identified diverse entanglements between the human and non-human elements (seeds, plants, soil, weather, ginning machine, cattle) in their living environment, emphasising the need for a careful nurturing of these relationships to secure the required livelihood outcomes. Drawing on their local knowledge of soil, plants and climate, they sought to maintain a sustainable balance between food and indigenous cotton crops, while at the same time endeavouring to resist, during this period, the attempted colonial promotion of foreign cotton varieties. Viewing the lands they occupied as a life-sustaining 'commons', they perceived colonial attempts to commodify them through the production of export-oriented cotton as threats to their control over the means of subsistence and to the self-sufficiency of the household.

An environmentally nurturing 'anti-commodity' consciousness thus pervaded the peasants' productive activities based on the perception that the lands they farmed were integral to the reproduction of their lives; and they devised, to borrow Karl Polanyi's term, a 'countermovement' to colonial designs that relied on a fluid strategy involving passive non-compliance with official objectives and active affirmation of their

own crop choices and cultivation practices rooted in their knowledge of the local agrarian environment.⁴ Usually shunning outright confrontational modes of resistance, the peasant cultivators of Dharwar were, as in their response to the revenue officials here, more intent on emphasising the reasonableness of their refusal to comply:⁵ the desired introduction of the foreign cottons would not only disrupt and endanger their livelihoods, it was also based on erroneous colonial assumptions and judgements regarding the sturdiness and productivity of these varieties. Having experientially established the flawed theoretical basis of colonial cotton designs, the cultivators could then go on to affirm their accustomed modes of cultivation rooted in more expansive livelihood objectives.

By articulating an awareness of the reciprocal relationship between economic agrarian production and natural environmental life, these peasant voices also invite a political ecological engagement with their situated histories. A fluid, cross-disciplinary approach rather than a 'theory' in the conventional sense,⁶ historical political ecology emphasises the idea of 'social nature', that is to say the co-constitutive and entwined processes between human and natural agencies that have historically produced socio-natural environments, thus making any analytical separation between 'human' and 'natural' redundant; at the same time, the scope of what can be considered significant historical actors is extended to a wide variety of natural phenomena which interact with the political world of human struggles. Indeed, socio-natures are physically (re)constituted over time to serve specific and often hegemonic social interests.⁷

Historical political ecology is also quite explicit in its commitment to a 'history from below' perspective, exploring in particular the modes of creativity and resilience of local communities (often indigenous peoples) faced with past environmental challenges rooted in specific socio-political conditions. Moreover, its emphasis on the time and place specificities of socio-natures as well as of environmental historical narratives, entails a particular methodological strategy that relies on a detailed investigation of primary sources and a close re-reading of archival documents so as to determine their spatially specific historicity.⁸

Colonial cotton misconceptions

In seeking to transform the 'alien' cotton environments of Dharwar and the Southern Maratha Country in the aftermath of conquest, incoming British officials invariably met with disappointed hopes and unintended

consequences largely as a result of introducing erroneous agricultural practices. In the early 1830s, the Edinburgh-trained surgeon-naturalist Dr Charles Lush believed that the cotton experiments he was about to undertake would flourish on the 262-acre government farm in Sigihalli, Belgaum rather than in the more obvious black cotton lands of eastern Dharwar. Lush relied on his own expertise and the aid of his carefully chosen assistants and did not seek information or involvement from the local peasant cultivators. As the main objective of his cotton experiments was to introduce 'the culture of superior kinds of perennial cotton and improvements in the indigenous mode of cultivation, cleaning and preparation of annual cottons', he deliberately sought to bypass local cultivating knowledge and practices (Figure 5.1).⁹

Locating the project in the red rocky soil of Sigihalli, which he admitted was not 'what is usually understood by a cotton district', would, he believed, spur the naturalisation of Pernambuco cotton, one of the foreign perennials: here it could be watered by a stream if necessary, whereas it had failed to thrive in the black soils of Dharwar in 1829. Moreover, he asserted that there would be no 'habits or prejudices' that would get in the way of securing 'improved' modes of cotton cleaning. In addition to the Brazilian Pernambuco, the trials with foreign cottons involved Bourbon and American Georgian Upland perennials as well as another American annual variety, New Orleans. Lush's plan was to eventually extend the perennial cottons grown on the farm throughout Dharwar district once he was able to demonstrate their viability to, and incentivise, local cultivators.¹⁰

These cotton plants, however, failed to thrive in the red soil, which in the hot arid climate could not retain moisture for the required length of time, nor was Lush's attempts to use the local stream for irrigation purposes successful. He also remained unaware of local cultivators' practice of using manures to increase the fertility of red soil lands. As a result, the Pernambuco plants became increasingly blighted and produced very poor crops. The Bourbon cotton that was planted at the same time failed to come up at all, while the Georgian Upland and New Orleans varieties degenerated rapidly, yielding nothing of value.¹¹

With the bulk of the foreign cotton experiments at Sigihalli appearing to fail by the early 1830s, Lush was forced into a change of heart and took American seed to the Dharwar cotton country to be sown by local cultivators. Here, he found that he had to offer cultivators in Navalgund 'considerable advances in price of about 30 per cent' to get them to sow this cotton and pick it "clean". Moreover, Lush discovered that New Orleans cotton only fetched a quarter of a pence more

Figure 5.1 Map of Southern Maratha Country in the 19th century, comprising the districts of Dharwar, Belgaum and Bijapur, by Jenny Kynaston

on the Bombay market than local Kumta cotton, so the experiment failed to give the American variety ‘an additional value commensurate with the expense of preparation’. He was forced to conclude that even if successfully grown, the foreign perennial cottons ‘cannot be extended

throughout the Dharwar district as the rise in value and extension of its own staple is sufficient to prevent this'.¹²

Moreover, no solution was found to one of the main issues identified by the cultivators themselves – the brittle nature of the foreign cotton plants. Lush had entertained high hopes that the new state-of-the-art Whitney saw-gin, 'so easily worked that it can even be managed by slaves' according to one colonial official, would do for the foreign, and perhaps even Indian, cottons what it had apparently achieved for American cotton.¹³ In America, by revolutionising the speed at which the wool was separated from the seed, this machine was credited with enabling a massive leap forward in cotton production during the first couple of decades of the 19th century. In the Southern Maratha Country, however, the staple of the American plants had been transformed by exposure to the local climatic environment, becoming more brittle and unstable, and it could not withstand the high velocity of the saws of the Whitney machines. The fibre of these cottons was often 'cut to pieces' and rendered useless for manufacturing purposes.¹⁴ In 1835, use of the Whitney saw-gin was forbidden by order of the Bombay government, and a year later the Sigihalli Farm was closed down for good.¹⁵ The Bombay government's verdict was that Lush's experiments had failed: after six years of the Farm's existence, none of the cultivators in its vicinity had taken to growing any of the foreign cottons, nor had they 'in the slightest altered or deviated from their accustomed modes of cultivating, gathering and separating the cotton from the seed' (Figure 5.2).¹⁶

This failure, however, did nothing to dissuade Lancashire, where the cotton crisis of 1837 led to renewed pressure on the East India Company's Court of Directors in London to step up measures to secure supplies from India with the eventual aim of replacing its dependence on the United States. The Court of Directors responded by instructing local governments in India to undertake an unprecedented experiment in cotton improvement, hiring 12 American cotton planters recruited from the state of Mississippi, who were to work with colonial botanists under the supervision of the local governments. Arriving in India in 1840, the planters brought with them 'large quantities of the best cotton seed, American ploughs and hoes, saw-gins, and presses for packing the cotton after cleaning'.¹⁷ As a governmental initiative, cotton 'improvement' now reached an entirely new level, characterised by substantial funding designed to support interventions from these technical 'experts'.

But in the Southern Mahratta Country few if any lessons appeared to have been learnt from the failure of Lush's experiments. The new cotton

Figure 5.2 Map of India showing Dharwar district and Sigihalli Farm, by Jenny Kynaston

project, moreover, continued to be beset by inter-colonial disagreements, essentially caused by the local agrarian environment's refusal to conform to colonial preconceptions about its 'productivity'.¹⁸ Local colonial officials and American planters rapidly found themselves at

loggerheads due to professional rivalries and conflicting knowledge claims about how best to make the cotton landscapes more productive. Himself an enthusiastic naturalist, the Collector of Dharwar, A. N. Shaw, drew on the promising outcomes of the New Orleans experiments conducted by local smallholders under Lush to induce the raiyats to take up, once again, the growing of American cotton in their own fields according to their accustomed methods.

In contrast, W. R. Mercer, the American planter assigned to the Dharwar region, followed the blueprint of previous experiments by locating them on special government farms away from the main cotton-growing areas, where he attempted to change the seasonal timing of the sowing process and to introduce the essentials of the 'American' method of cultivation. He instructed the local cultivators employed on the government farm to begin planting New Orleans cotton in June instead of their usual practice of sowing Kumta in late August or early September.¹⁹ Moreover, in place of the Indian method of thick, broad cast sowing, with the plants closely huddled together, the American cotton was planted in rows up to five feet apart, with the soil subjected to frequent ploughing and hoeing with expensive imported implements; and in a further departure from the local cultivating pattern, there was an emphasis on intensive mono-cultivation without crop rotation during the initial experimental years (1843–45).²⁰

But natural forces in the shape of weather and pests wreaked havoc on the experiment, as 'constant high winds' disrupted the growth of the American plants in the first year, while the following year, sowed on the same soil, they 'were attacked by field bugs and caterpillars and yielded poorly', two-thirds down on the previous year.²¹ In contrast, the neighbouring fields of the local cultivators produced a good crop of American cotton, which both Shaw and Mercer admitted to being far superior to the produce of the government farm. Shaw now roundly condemned the experimental farms as 'an exemplary failure', convincing in effect the Bombay government to close them down for good.²² With Shaw's temporary absence from Dharwar on sick leave, Mercer now attempted a new strategy to promote the cultivation of New Orleans, offering contracts to local peasants to grow the cotton in their own fields, under the supervision of the Acting Collector, Mansfield.

Mansfield issued instructions to the mamlatdars 'to take much pains and cause the ryats to sow as much of the seed of the American cotton as possible, and you are to report to me how many acres and how much seed has been sown in each village'.²³ Under constant pressure to maximise revenue, the mamlatdars saw it as their duty to take whatever

measures necessary to increase the cultivation of cash crops.²⁴ They went round the villages of Dharwar prescribing the times of sowing, weeding and picking the American cotton. Revenue officialdom tended to be perceived as oppressive at the best of times, and these injunctions further alienated the raiyats, threatening their accustomed seasonal patterns of cropping which were primarily oriented towards food production. Peasants who stuck to their established modes of cultivation found themselves subjected to interrogations and fines by revenue officials. By early 1847, they were expressing their distaste for the contract system to the new Dharwar Collector, Bell, referring to it as *upaddrav* (physical oppression).²⁵ They also complained about the new saw-gins brought by the American planters: these proved to be little improvement on the Whitney machine, once again damaging the transplanted cotton during the cleaning process, cutting the staple and rendering it 'weak and uneven'.²⁶ The raiyats reiterated their view that, in their experience, the American plant 'did not thrive' in comparison with Kumta and that its seed was less valuable as food for their cattle.²⁷

A project which had aimed at winning over peasants' hearts and minds to a new cotton species and a different mode of cultivation had secured precisely the opposite outcome. The failure of the cotton environment to meet 'improvement' expectations generated anxieties which manifested themselves in a further intensification of inter-colonial discord about the best way forward. The returning Shaw laid into Mercer's contract system, which he warned could only lead to the ruin of the American cotton experiment as it was based on 'governmental monopoly'. This regime, he asserted in a letter to the Bombay government, was 'bound to fail' as the principles of contract and compulsion under which it was carried out 'prevented the real market value of the cotton being known' to merchants, nor was there any real incentive for contract peasants to exert themselves. Shaw roundly condemned the Americans who, he observed, had come to Dharwar at his official request, but had proved to be 'neither good agriculturalists nor mechanics'.²⁸

The Bombay government duly instructed Collector Bell to abolish the contract system in February 1847, convinced by reports reaching them that village-based revenue officials had indeed used various methods of compulsion to 'persuade' the raiyats to grow American cotton.²⁹ This was undesirable and had simply resulted in reinforcing their 'prejudices' against it. Mercer had resigned a few months earlier but before leaving the country, he got back at Shaw by radically questioning not only the contract system which he had himself largely devised, but

the entire colonial project of introducing American cotton in India. He now asserted that neither Dharwar nor anywhere else in India possessed the right climate for the introduction of American varieties; these cottons would not be sustainable and would not provide any 'lasting benefit'.³⁰ By the mid-1850s, with little to show for their expenditure of £100,000 on the project, the Court of Directors brought the state-directed American cotton experiments in India to a close.³¹

Peasant crop choices and the maintenance of a sustainable socio-nature

By the end of his stay in Dharwar, Mercer had been converted to the indigenous methods of crop cultivation. He observed that

the American system of cultivation was not suitable to India and [...] the natives were, from their knowledge of the climate and capabilities of the soil, able to cultivate better than any European [...] the skill exhibited by the ryots in their agricultural operations was very superior and their economical system enabled them to obtain much larger returns on the capital invested.

As a result, he concluded, 'little change or improvement' was required in the system of Indian agriculture, which was 'well adapted to the circumstances of the country and of the climate'.³²

But cotton was, as we have seen, merely a subsidiary crop: smallholders who made up the bulk of the *Lingayat* agricultural population oriented their crop choices around the production of jowar (*sorghum vulgare* or Indian millet) designed to sustain household livelihoods and reduce the risks resulting from climatic hazards. A rainfed, eco-friendly crop, jowar and its products served as the main food for the local population, with the grain being either broken down and cooked into little cakes or ground into flour and made into chapatis; the straw, moreover, provided the best fodder for their cattle.³³ Peasants used their knowledge of local soils and microclimates to optimise production of this crop as they were aware that it could withstand short-term drought conditions, remaining dormant in moisture-deficient conditions and resuming growth with the arrival of more favourable weather. As a result, they were able to grow 18 different varieties of this foodstuff, all maturing within three to four months of sowing. Sixteen of these were *mungari* (early) crops, sown in June/July, at the onset of the south-west monsoon, drawing on the nourishment provided by the plentiful

rainfall over the western red soil hills and on the greater moisture-retaining capacity of the black soil of the eastern plains, where these monsoon rains were far less reliable.³⁴

The other two, known as *bili jola* and *kari-goni jola*, were finer varieties and generally preferred in the preparation of food. These were *hingari* (late) crops, grown solely on black soil, sustained by the more regular rainfall of the north-east monsoon over eastern Dharwar in September/October.³⁵ If the cultivators judged that these rains were adequate to ensure prolonged moisture in the soil after the monsoon, they would grow a second late grain crop, usually wheat or *gram* (pulses) to succeed, on the same fields, the early jowars.³⁶ Indeed, jowar was not merely a subsistence crop but, with a huge local demand for its straw used as cattle fodder, a surplus was produced for the market. In a region of climatic vulnerability, the crucial importance for smallholding raiyats of jowar food production, supplemented by the often considerable possibilities of local sales, was barely recognised by the colonial state even though cultivators' occupancy rights meant that it could do little to actually limit its production. Jowar did not feature in official agriculture policy-making as it was perceived to be a 'low value' crop for revenue purposes. This would not be the last time that the policies of British colonial officials designed to introduce or prioritise specific cash crops would fail owing to their refusal to recognise the importance of food crops for both local consumption and exchange.³⁷

From their knowledge of soil and climate, peasants were also aware that the deep moisture-holding capacity of the black soils was capable of hosting jowar and the local Kumta cotton in a complementary pattern of rotation. Fields sown with jowar in one year would have cotton (and in some places, wheat) planted the next year, and vice versa.³⁸ Like jowar, Kumta cotton had a significant function in sustaining household livelihoods, with peasants careful to put aside the best of the harvested crop for home spinning and local weaving (rather than for export markets), while the dry stalks were a cheaper alternative to firewood as fuel for cooking and heating.³⁹ Again, as with jowar, its seeds were also used as food for cattle and its leaves for sheep and goats.⁴⁰

Some of the high-quality yarn produced in their homes by the labour of women was passed on to *darzis* (tailors) or to village weavers who were paid only for the labour required for the manufacture of the cloth the peasants desired. As a result, a colonial observer noted approvingly, 'a much better description of cloth, in accordance with the taste of the consumer, is frequently manufactured'.⁴¹ This helped to create a strong cultural preference for handwoven cloth, which

included fabrics produced for particular religious functions where community bonds were re-affirmed. Surplus yarn was sold to merchants and weavers in the market towns of the district for the manufacturing of a wide variety of durable cloths for the local population. These 'peasant markets', largely featuring smallholding tenant producers still controlling the means of subsistence, provided local cultivators with outlets to sell these surpluses to support their own production for subsistence.

Jowar and Kumta thus had a productive ecological entanglement, their diverse and complementary properties meeting many of the essential needs of the local peasant population. In the first half of the 19th century, it was estimated that half of the cultivated Kumta cotton was consumed in the home market of the Southern Maratha Country and the other half exported, via the port of Kumta, to Bombay in the north (and from there mainly to China and, in very small quantities, to Britain) and to Bangalore in the south. With more outlets for sales than any other crop, cotton was always readily convertible into cash that raiyats could use to meet their land revenue payments. Nonetheless, its cultivation was always subordinated to the growing of jowar food crops. In fact, the smaller the farm, the larger the proportion likely to be taken up by subsistence food production.

George Wingate, the foremost Revenue Settlement official in western India during this period, noted that while at least 50,000 acres of land were suitable for cotton production in the south-eastern fields of Bankapur taluka, actual cultivation was 'considerably within this estimate' as on small farms 'more than half of the land suited for cotton I imagine to be appropriated to the production of food'.⁴² Even a reasonably well-to-do raiyat, holding 30 acres of cultivated land, would in a normal year set aside about 16 acres for jowar and not more than eight for cotton.⁴³ Very often, it was much less than this: in the taluka of Dharwar, for instance, it was reported that very little cotton was grown at all even though 'the climate is admirably suited to the crop' and 'the prices of produce range higher in this district than in any other of the Collectorate'. The raiyats, however, found it 'more profitable to raise jowar from which, besides the grain, a large return is obtained by the sale of the straw in Dharwar and the villages along the Belgaum and Hubli roads'.⁴⁴ In the eyes of the cultivators, jowar was evidently a more valuable all-purpose crop than cotton (Figure 5.3).

The raiyats were also keen to maintain and enhance the fertility of the socio-natural environment and they produced various kinds of manure to improve the soil, drawing on renewable elements from their

Figure 5.3 Dharwar district in the 19th century, by Jenny Kynaston

immediate surroundings. The main type of manure used, referred to by colonial officials as ‘mixed manure’, was made up from cattle droppings and urine, leaves of cotton plants, stubble from crops, earth, weeds and ashes collected in a pit in the compound of the raiyat’s house and allowed to increase as required. The pit ensured the coolness required

to prevent evaporation. One method was to throw the cattle urine, collected by ducts, into the pit, so that its saline properties and nitrogen would enrich and aid the fermentation of the manure. Just before the sowing season, the manure was carted to the fields, spread on the earth and ploughed into the soil. An approving British revenue official commented that the peasants 'have discovered what many in our own country seem yet to learn, that one of the best ways to retain the enriching properties of manure is to collect it in a *pit* and not in a *heap*'.⁴⁵

Another method was to get sheep and goats to eat the cotton plant leaves, the weeds and stubble, so that their urine and droppings could be used as manure. The sheep and goats would be moved all over the cultivated field to ensure an even spread. In this way leaves and grasses would be returned to the fields that produced them, but in a manner that fertilised and renewed the soil. An additional type of manure used to enrich the soil, known as 'green manure', was produced from *guryellu*, a local black variety of the oilseed plant *sesamum* (*sesamum indicum*). It was sown in late May or early June and grown for three months until it began to flower. It was then cut down by the *kunti* (heavy hoe) and ploughed into the soil, and considered sufficient manure for two years.⁴⁶ In areas of mixed arable/forest land, an alternative to using manure was the controlled burning of 'jungle' lands, with the soil allowed to lie fallow for a couple of seasons until the rejuvenated forest area sprang up again. Burning released nutrients into the soil and got rid of unwanted brush vegetation, and had long been practised by peasants as a sustainable mode of managing the local environment.⁴⁷

Peasants' resistance to growing more cotton – especially American cotton – was therefore based on their perception of the need to conserve and preserve existing lifeworlds. Through their experience of a challenging climatic environment, they were aware that this depended on the sustainable use of scarce natural resources such as good soils, water, animals and fuel. They quietly subverted both the wishes of the distant industrial capitalists of Lancashire and the expectations of the more local colonial government by persisting in cultivating according to their accustomed ways, and in maintaining the production of a diverse and balanced range of crops. In the process, they drew the admiration of more than a few local colonial officials with whom they interacted in the fields.

Climate change and cotton boom

Raiyats in the black soil localities of eastern Dharwar were well aware of the problematic nature of the local rainfall. Indeed, these jowar and

cotton producing areas could not rely on the 'uncertain and scanty' rainfall from the main south-west monsoon between June and August; instead, they were almost entirely dependent on the north-east monsoon between September and December. 'If it were not for the north-east or Madras monsoon', observed the *Dharwar Gazetteer*, 'much of the country would be liable to famine'.⁴⁸

In order to meet this climatic challenge, peasant cultivators had come to devise several strategies to reduce their vulnerability to the semi-arid environment. The most important was the practice of water-harvesting based on traditional storage reservoirs or tanks which collected surface run-off during monsoons. However, the maintenance of tanks had been neglected since the establishment of British rule, and their steady deterioration was to contribute to the local subsistence crisis of the 1860s.⁴⁹ Another strategy was to identify specific local topographies of rainfall, groups or even parts of villages which they defined as *malnad* or *muladu*, that is to say belonging to the region of rain. The peasants had learned to recognise not only rainfall timings but also differences in duration and intensity and were accustomed to naming the different falls of rain during the agricultural year according to the 27 lunar asterisms; these functioned as markers of seasons, with different seasons being described as beginning or ending with a particular named rain. The raiyats used these rains to inform the sequencing of their tilling operations; thus, the rains of the constellation of *Rohini*, between 23 May and 4 June, signalled the start of the *mungari* or *kharif* (early crop sowing) season.⁵⁰

In contrast to this nuanced and realistic understanding of local rainfall patterns, colonial officials constructed a general and wishful model of the climate of Dharwar, based on what Collector Shaw described as 'the unusual advantage of two rainy seasons'.⁵¹ Anxious to assert the 'cotton improvement' suitability claims of Dharwar and the Southern Maratha Country against what he perceived to be the Bombay government's bias in favour of the hitherto premier cotton district of Broach in Gujarat, and keen to secure the services of one of the American planters for Dharwar, Shaw had suggested that uniquely within western India, the Dharwar climate closely resembled that of the cotton-growing districts of the American south. In particular, he emphasised what he believed to be the lingering atmospheric moisture from the successive monsoon rains which, he proclaimed, would enable the New Orleans plant to mature properly.⁵²

Thus, in contrast to prevailing colonial discourse on human acclimatisation, which held that Europeans were inherently unsuited to Indian conditions, the reverse was imagined for plant acclimatisation in the

interests of cotton 'improvement'. However, not only was the climate of the relevant localities of Dharwar not quite what Shaw and other colonial officials had constructed it to be, it was also undergoing significant change owing to the virtually continuous deforestation in regions adjoining the Southern Maratha Country that had been occurring since the period of British conquest.

In 1846, at the height of the major experiment with American cotton, Alexander Gibson, Superintendent of the Dapuri Botanic Garden in Poona, submitted a report to the Bombay government on the state of the forests of south Konkan, north Kanara, and Soonda, located on the western and southern borders of Dharwar. The major clearance of forests in the southern Konkan in particular, he pointed out, had caused 'the climate to become drier, the seasons more uncertain, and the land less fertile'. This view was confirmed by his conversations with local inhabitants. But the really important message he sought to convey was that:

such a change of climate would not be limited to the district in which the clearance actually takes place. Take for example all the Southern and Western portion of Dharwar. This fertile country abounds in moisture insomuch that it has been rather inaptly compared to the valley of the Mississippi. At all events, American upland cotton grows there which it will hardly do in other parts of the Bombay Presidency. I think it is not too much to say that much of this moisture depends on the wooded country forming its western border, and that with the complete removal of this, the climate would greatly change.⁵³

Five years after Gibson's report, the Medical Board, effectively the Health Department of the Bombay government, was concerned enough to press the Revenue Department to release funds 'for improving the climate of Dharwar through the planting of trees'. This was now urgent as

on the authority of the old native inhabitants, the climate had undergone very considerable deterioration during the last 10 or 15 years, and the reason mentioned is the clearing away of the forest and brushwood which once closely approached the station to the south and west. The effect upon the climate is said to be a diminution of moisture as regards night dews and passing showers. This as a matter of course has affected the temperature and, natives say, the healthiness of the station.⁵⁴

Embedded in the colonial archive, we find in this passage, however muted and indirect, the voices of the people of Dharwar as authentic witnesses of a changing climate, their local knowledge and longer experience of their environment convincing more temporary colonial officials of the veracity of their views. The effects of the climatic changes on the fertility of the agrarian environment began to be observed from the mid-1860s in the midst of a fresh 'cotton improvement' initiative spearheaded once again by Lancashire, and provoked by the total collapse of raw cotton supplies to British factories during the American Civil War. By this time, India was supplying 71 per cent of the cotton imported into Britain, compared to just over 12 per cent prior to the outbreak of the Civil War, and Dharwar played its full part in helping to relieve Lancashire's 'cotton famine'.⁵⁵ However, the combined effects of climate change and cotton boom now produced fresh challenges to the livelihoods of the smallholding raiyats.

This period was marked by a resurgence of New Orleans cotton (now renamed 'Dharwar-American') which had begun in the mid-1850s, facilitated by its partial acclimatisation after a decade and a half, by an uptake in international demand as a result of the Crimean War, the introduction of a new, successful ginning machine produced locally, and the easing of the land tax burden on the raiyats following Wingate's revenue reforms.⁵⁶ The explosion in demand during the years of the Civil War led to the trebling of the local price of American cotton between 1860 and 1864.

However, this sudden and ultimately short-lived international demand for just one crop, cotton, led not so much to the 'commercialisation' of local agriculture hoped for by the Bombay government's newly set up Cotton Department, as to its distortion and unsustainability. The price hike in American cotton was not only due to demand from Lancashire but more fundamentally to speculative practices on the part of local *sawkars* (bankers) who 'backed by Bombay speculators paid as much as £10 (Rs.100) the acre for planted cotton fields', a grossly extravagant sum even in relation to prevailing prices.⁵⁷ In these circumstances, the pressure on peasant cultivators to plant 'every available patch' with cotton was immense, disrupting the finely balanced ecology of peasant crop production.⁵⁸ In particular, there was an observed drop in previous patterns of sustainable farming through crop rotation which impacted adversely on the cultivation of jowar food crops for domestic consumption.⁵⁹

But the cotton bubble burst as abruptly as it began, an interaction of climatic and economic processes heralding its demise from

the mid-1860s. Inadequate rainfall affected the north-eastern talukas of Dharwar over two consecutive seasons, 1864–65 and 1865–66, in the middle of which the American Civil War also came to an end. The yields of all crops diminished and cotton prices fell, immediately putting peasants under severe economic pressure. Crop failure was, however, particularly crucial in the case of jowar food crops, whose cultivation had fallen significantly since the early 1860s, resulting in over a four-fold increase in their price. One rupee could buy 90 lbs of millet in 1860, but only 20 lbs in 1866.⁶⁰ With food grains both scarce and expensive, eastern Dharwar was hit by famine in the summer of 1866, a prologue to the more severe outbreak of 1876–77. Significantly, the most afflicted localities were the main cotton-growing talukas of Navalgund, Ron and the Dambal area of Gadag, which had been specifically chosen two years earlier by the Cotton Department as a privileged site for growing Dharwar-American cotton.⁶¹ Famine signalled a rupture in the mixed and diverse cropping system that local raiyats had carefully built up to guard against the risks of climatic catastrophes. The exacerbated cotton imperialism of the 1860s had culminated in a subsistence crisis for the traditionally well-adapted peasant communities of the eastern talukas of Dharwar.

The demise of Dharwar-American cotton

Climate change continued to affect the agrarian environment of Dharwar beyond the crisis of the mid-1860s, culminating in the devastating monsoon failure of 1876–77. The thinning of the forest belts of southern Konkan and Soonda, and the decimation of Dharwar's own forest cover, led to a number of adverse consequences that were particularly felt in the eastern talukas. First, there were overall drops in rainfall and in atmospheric moisture which put the people of the eastern plains under increased pressure, particularly in a region with declining water storage facilities such as ponds and wells, much neglected during the first half-century of colonial rule.⁶²

Secondly, rainfall for agricultural purposes, which could in other words be productively utilised by crops to support their seasonal growth, became more unpredictable. Here the timing of the rain was all-important, and the absence of showers until September, following a number of seasons of deficient rainfall, precipitated the food crisis of 1866; conversely, unseasonal or excessive rainfall could also have a destructive impact on crops, as in 1869, when 'losses in cotton production after initial optimistic forecasts' were partly attributed to rain

falling in December and 'dark and cloudy weather instead of sunshine which is always indispensable for cotton after the ground has been well soaked'.⁶³

Thirdly, the loss of protective regional forest and local tree and shrub cover adversely impacted on soil fertility in Dharwar's eastern plains. Soils under fallow were now subject to intense direct heat from the sun, reducing their moisture storage capacity and increasing their susceptibility to wind erosion; moreover, unchecked by tree cover, the post-monsoon winds were now free to exercise unprecedented effect. Dharwar's hot easterly winds gained in intensity as well as, with the fall in atmospheric moisture, in dryness, with dramatic effect on the cotton plants. In 1869 Cotton Commissioner Forbes gave the following explanation to the Bombay government for the reduction in that season's cotton crop:

A plentiful fall of rain towards the end of September gave a great impetus to the young plants so that during the next three months they continued to maintain a strong and promising appearance, which gave rise to anticipations of a better crop than any that had been realised for many years. Unfortunately, however, at the beginning of January, dry, searching easterly winds set in, the pernicious effects of which are well known and dreaded by the cultivators; and as early as the 4th of that month, their first bad effects began to appear in the shape of a species of blight, which very soon became general.⁶⁴

A year later, Forbes was again reporting on the destructive effect of this 'wind blight', describing it as 'the bane' of the Southern Maratha Country. Moreover, he observed,

of late its recurrence has been more frequent and its influence more severely felt. It may be described as the effects of a hot wind, more injurious from its peculiar dryness than from the heat that accompanies it. Its action on the cotton plant is direct and speedy and no amount of moisture in the soil will avert it.⁶⁵

Another consequence of the accentuated dry climate was that 'exposed to the fierce rays of the sun' during the fallow period, the upper surface of the soil became 'baked and hardened into a crust, which is about as inaccessible to the plough as if it were a pavement'. Forbes concluded that in his view, increasing cotton crop losses were due to 'climatic

influences, the nature of which we are as yet but very imperfectly acquainted'.⁶⁶

Both varieties of cotton clearly suffered from the effects of climate change. However, the greater moisture requirements of Dharwar-American cotton at crucial stages of plant growth meant that it became particularly vulnerable to the drier and increasingly unpredictable weather conditions; while Kumta, maturing later, had a better chance of 'escaping an early setting in of the injurious dry winds'.⁶⁷ Unseasonal weather, moreover, often attracted pests that continued to primarily target the 'exotic' American variety. For instance, in the 1878–79 season, which was characterised by generally 'unfavourable' weather, the yield of Dharwar-American cotton was described by Cotton Inspector Walton as having been adversely affected by 'the rats which infested the cotton fields' and which apparently 'committed the greatest mischief among the American plants, devouring the finest bolls; as a result, the crop proved unsatisfactory to such a degree that very few European merchants would have anything to do with it'.⁶⁸

The American variety continued to be the main focus of the Cotton Department's 'improvement' programme for a decade and a half after the end of the cotton boom, but with increasingly diminishing returns. It became clear that the seed of New Orleans was deteriorating but neither a careful selection of local acclimatised seed nor the importing of pure fresh seed provided by the Cotton Supply Association in Britain, seemed to be able to arrest the loss of germinating power.⁶⁹ Overcropped during the cotton boom years, the black soils of the eastern plains additionally lost moisture and fertility as a consequence of deforestation, and with 'bad seasons' recurring more frequently, all of this combined to take their toll on Dharwar-American cotton. Its plants had lateral roots that tended to spread close to the surface, that is, the driest levels of the soil beyond the initial stages of growth, in contrast to Kumta whose long tap-root enabled it to draw moisture and sustenance from greater depths.⁷⁰ By the 1870s, New Orleans had reportedly 'declined in staple and lost its silkiness'.⁷¹

Walton now reported that local prices for 'machine-ginned' (American) cotton had dipped below those at which 'fair foot-rolled' (Kumta) cotton were selling.⁷² Dharwar-American had now lost its leading position amongst Indian cottons in the market. As it dropped in yield, quality and price, the dealers and large landholders who had championed its expansion began to drastically cut back cultivation. In 1880, the Cotton Department reported that 'much of the land formerly devoted to exotic (American) cotton was turned to the cultivation

Table 5.1 Dharwar cotton cultivation area 1842–83

Year	New Orleans	Kumta	Total	Year	New Orleans	Kumta	Total
	Acres	Acres	Acres		Acres	Acres	Acres
1842–43	27	184,237	184,264	1863–64	323,535	203,626	527,161
1843–44	545	178,411	178,956	1864–65	280,230	185,374	465,604
1844–45	2,749	182,437	185,186	1865–66	261,943	160,046	421,989
1845–46	11,176	164,591	175,767	1866–67	304,688	161,750	466,438
1846–47	22,331	167,592	189,833	1867–68	300,399	181,485	481,884
1847–48	20,502	179,229	199,731	1868–69	317,310	194,586	511,896
1848–49	3,351	201,578	204,929	1869–70	425,099	222,116	647,215
1849–50	15,573	225,685	241,258	1870–71	335,297	195,304	530,691
1850–51	31,668	223,315	254,983	1871–72	315,387	203,191	518,578
1851–52	42,647	221,676	264,323	1872–73	195,809	318,448	514,257
1852–53	28,010	251,114	279,424	1873–74	215,325	268,169	483,494
1853–54	41,403	252,006	293,409	1874–75	234,341	221,343	455,684
1854–55	63,298	210,260	273,569	1875–76	336,235	232,630	568,865
1855–56	66,514	202,843	269,357	1876–77	44,024	99,830	143,854
1856–57	108,207	196,931	305,138	1877–78	128,277	277,300	405,577
1857–58	130,880	252,850	383,780	1878–79	246,210	233,280	479,490
1858–59	124,752	214,993	339,745	1879–80	141,726	331,465	473,191
1859–60	191,281	230,665	421,946	1880–81	77,121	439,251	516,372
1860–61	191,026	234,452	425,478	1881–82	138,790	395,396	534,186
1861–62	214,310	200,491	414,801	1882–83	145,397	375,070	520,467
1862–63	363,174	207,063	570,237				

Source: J. M. Campbell (1884), *Gazetteer of the Bombay Presidency*, vol. 22: Dharwar, p. 302.

of the indigenous fibre' amid 'a general disinclination' to cultivate this cotton which was now perceived as 'unremunerative'.⁷³ Kumta was back with a vengeance, its cultivated area comprising in that year a record 439,251 acres compared to Dharwar-American's mere 77,121 acres, effectively pulling the latter back to its mid-1850s position.⁷⁴ By this time too, steam machine-ginning of Kumta, introduced during the cotton boom of the 1860s, had been 'entirely discontinued' as 'it was found that it could not successfully compete with "foot rolling"' (Table 5.1).⁷⁵

Even so, with the easing of the pressures of the cotton boom period coupled with their experience of increasingly erratic rains, the peasants quickly resumed the prioritisation of jowar food grain cultivation: jowar dominated the cultivated land acreage, habitually occupying around one-third of the tillage area of Dharwar. As Walton recognised in 1873, the culture of cotton continued to be primarily determined 'first by the

quantity of grain left in the district' and 'second by the rainfall of the season'. Jowar remained the premier crop and the one prioritised to receive the expected rainfall; buoyant local demand, moreover, tended to increase its cultivation at the expense of cotton.⁷⁶ Kumta remained important as a subsidiary 'dry' crop that brought money into the villages, as 'the *one* article that always commands the readiest and best sale', but it is clear that the raiyats were still, in the late 19th century, holding firmly to their risk-averse patterns of crop production.⁷⁷

At the same time, climatic factors interacted with economic processes to deal a seemingly mortal blow to the fortunes of American cotton. Kumta had coped with the local decrease in moisture levels rather more robustly than Dharwar-American: unlike the latter, it was not prone to complete crop failure in adverse weather seasons.⁷⁸ Synchronistically, the emergence of the Bombay cotton textile industry in the 1870s led to a new and 'very large' demand for the Indian variety from its steam-spinning and weaving factories as well as increasing demand from spinning mills now emerging in the Madras Presidency. The increased Kumta cultivation was geared to meeting the demand of the Bombay mills as well as of local village spinning and weaving, which by the mid-1870s had reached very large proportions compared to its 'insignificance' a decade earlier. Indeed, it was observed that for cultural reasons, Kumta remained 'the greatest favourite with native weavers'. Virtually none of it went into the export market.⁷⁹

In contrast to Kumta's resurgence, Dharwar-American cotton lost favour with Lancashire as supplies from the United States recovered towards the end of the 1860s, while the appearance of another cheap and abundant variety from the States known as 'middling New Orleans' deprived it even of a role as an efficient substitute.⁸⁰ This was part of a wider picture that saw Indian cotton exports to Britain drop by 60 per cent by the end of the 1870s, a prelude to the UK's virtual disappearance as a market by the mid-1890s. Meanwhile, the winding down of the cotton improvement programme in the Bombay Presidency was signalled by the abolition of the post of Cotton Commissioner in 1873.⁸¹ The Cotton Department lived on borrowed time for another decade, sending its final report in October 1883. Two months later, it ceased to exist.

Conclusion

For British colonial officials in 19th-century Dharwar, cotton represented the natural fibre that could be magically tamed and engineered into a 'transformative commodity' in the interests of both Lancashire industrial groups and local government revenue generation.⁸² It

symbolised and represented the potential of the local agrarian environment to be transformed and commodified by demonstrating the superior monetary values that peasant cultivators could realise by focusing on growing produce for the export trade. The attempted social engineering of cotton into an internationally consumable industrial product involved an impressive array of entangled initiatives for over half a century, comprising the introduction of and experiments with new American plants, the application of 'superior' foreign botanical knowledge, attempts to persuade local raiyats to improve their cultivating practices, experiments with different ginning machines and, ultimately, the use of colonial state power through the setting up of a new government department exclusively devoted to cotton 'improvement'.

However, these attempts at transforming the cotton landscapes of Dharwar were confronted by a range of socio-natural forces that colonial knowledge never quite got to grips with, and which therefore resisted and limited commodification. The entwined social and natural worlds of peasant crop choices, cultivating knowledge, climate, rainfall and soil presented formidable barriers to colonial cotton designs. Lush's inadequate understanding of the local climate and soils and his dismissal of peasants' cultivating practices condemned his initial experiments with foreign cottons to failure. No advance was made by succeeding American planters who similarly introduced inappropriate cotton cultivating methods that left the plants exposed to bugs and insects.

Above all, the experiments with American cotton in the 1840s relied on an erroneous construction of the Dharwar climate which was held to be similar to that of the cotton-growing regions of the American south. In fact, the 'delicate' plants generally failed to flourish in the absence of the expected rainfall levels, while those that did come up were then subjected to inappropriate ginning machines, rendering the staple unfit for manufacturing purposes. Moreover, rainfall in the main crop-producing areas of Dharwar soon suffered additionally from the effects of climate change, an 'unintended consequence' of the colonial transformation of the adjoining regional forests in the first half-century. As colonially produced 'socio-nature', the drier climate in turn exercised a blowback effect on, and ultimately disrupted the experiment with, Dharwar-American cotton unleashed with new urgency in the early 1860s in the wake of the American Civil War. Indeed, even this short-lived cotton frenzy primarily benefited moneylenders and speculators and ultimately had a disastrous impact on both the agrarian and human environments.

Partially as a result of these failures, the peasant cultivators of Dharwar remained unconvinced for most of this period by the claims made

in favour of American cotton as a higher-value product than the local Kumta variety. But more importantly, in a climatically vulnerable region, Kumta was integral to their diverse, risk-reducing cropping system primarily focused on ensuring food security and well adapted to the local agrarian environment. It contributed to sustaining household livelihoods, with local demand for this cotton remaining buoyant. Here, the local and regional markets for both Kumta cotton and jowar food crops were perceived as sites of opportunity, to be engaged with alongside their main preoccupation with production for subsistence. The cultivation of these crops could be increased if and when promising opportunities for sale presented themselves. In contrast, except for a short-lived period in the early 1860s, the peasants resisted the lure of replacing Kumta with American cotton, which they viewed as more risky in terms of potential returns from a rather uncertain export trade, as well as less ecologically supportive of their wider livelihoods.

In this context, Kumta cotton was only partly produced for sale, and its market was not a site of compulsion. Instead, it was an element of the anti-commodity logic of the peasant cultivators' relationship with their agrarian environment which was nurtured as the material source of their livelihoods rather than, more narrowly, as land primarily suitable for commodity production for the global capitalist market. Official cotton objectives were met by a repertoire of quiet resistance appropriate to existing colonial conditions and involved non-compliance with proposed agricultural changes and active affirmation of their own crop choices and cultivation practices. But also engaged in subverting these objectives were non-human agencies in the form of climate, soil and pests. The 'non-cooperation' of climatic elements, such as rainfall and wind in particular, was probably decisive in the failure of the American cotton projects. While the concept of anti-commodity is, as this volume testifies, necessarily open to a variety of meanings, this chapter has emphasised its ecological dimension expressed in a peasant counter-movement to colonial designs that was essentially concerned with validating the production and use of the Dharwar agrarian environment as a sustainable socio-nature, and one on which depended the well-being of both human and non-human.

Afterword

This chapter is loosely based on two articles that have appeared in the *Journal of Historical Geography*, 38 (2012), pp. 1–17, and 42 (2013), pp. 88–99. Thanks to Jenny Kynaston for the maps.

Notes

1. Following Agrawal and Sivaramakrishnan, I use the term 'agrarian environment' rather than 'land' to emphasise the inclusion of the natural world within the sphere of rural production: A. Agrawal & K. Sivaramakrishnan (2000) *Agrarian Environments. Resources, Representation and Rule in India* (Durham, NC and London: Duke University Press), pp. 12–13.
2. D. Hall-Matthews (2005), *Peasants, Famine and the State in Colonial Western India* (Basingstoke: Palgrave Macmillan), p. 5.
3. Baker, Principal Collector Dharwar, to Government of Bombay (hereafter GOB), Revenue Department, 6 June 1835. Board's Collections, F/4/1635 no. 65498. Papers relative to cotton experiments in Bombay Presidency 1835–36, British Library (London), India Office Records (hereafter IOR).
4. In his classic account of the deficiencies of free market capitalism, *The Great Transformation*, Karl Polanyi argues that since the early 19th century resistant countermovements, historically involving a variety of social groups, have arisen from the need to protect life-sustaining natural environments from capitalist commodification: K. Polanyi (2001)(1944) *The Great Transformation* (Boston, MA: Beacon Press), pp. 151–2.
5. James Scott has suggested that passive non-compliance is one of the most commonly recurrent modes of everyday peasant resistance against those who attempt to extract taxes, labour, rents and food from them: J. C. Scott (1985) *Weapons of the Weak. Everyday Forms of Peasant Resistance* (New Haven, CT: Yale University Press), pp. 29–32.
6. For a comprehensive introduction to political ecology, see P. Robbins (2012) *Political Ecology* (Malden, MA and Oxford: Blackwell Publishing).
7. N. Castree and B. Braun, eds (2001) *Social Nature: Theory, Practice, and Politics* (Malden, MA and Oxford: Blackwell Publishing), p. 3.
8. K. H. Offen (2004) 'Historical political ecology: An introduction' *Historical Geography*, 32, p. 21.
9. Chief Secretary Reid, GOB, Territorial Department, to Court of Directors, 25 August 1836. Board's Collections, F/4/1635, no. 5503, IOR.
10. Ibid., Lush to Reid, 21 April 1835. Board's Collections, F/4/1635 no. 5503, IOR.
11. J. M. Campbell (1884) *Gazetteer of the Bombay Presidency*, vol. 22: *Dharwar* (hereafter *Dharwar Gazetteer*), Bombay, p. 287.
12. Lush to GOB, 1 December 1835. Board's Collections, F/4/1635 no. 5503, IOR.
13. Court of Directors to GOB, 16 February 1829. Board's Collections, F/4/1250, no. 50348, IOR.
14. GOB, Revenue Department letter, 4 March 1835. Board's Collections, F/4/1635, no. 65498, IOR.
15. Lush to Reid, 21 April 1835. Board's Collections, F/4/1635 no. 5503, IOR.
16. Reid to Court of Directors, 25 August 1836. Board's Collections, F/4/1635, no. 5503, IOR.
17. J. F. Royle (1851) *On the Culture and Commerce of Cotton in India and Elsewhere* (London: Smith & Elder), p. 240.
18. J. Beattie (2011) *Empire and Environmental Anxiety* (Basingstoke: Palgrave Macmillan), p. 1.
19. *Dharwar Gazetteer*, p. 288.

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20. *The Spectator*, 26 February 1842. Collections of Correspondence regarding the introduction and cultivation of American cotton and machinery in India 1839–42, H/374A, IOR.
21. *Dharwar Gazetteer*, p. 288.
22. A. N. Shaw to J. G. Lumsden, Bombay Revenue Department, 18 December 1847. Board's Collections, F/4/2317 1848–49, file nos 120035–7, IOR; Mansfield, Acting Collector of Dharwar, to Chief Secretary Pringle, Bombay Revenue Department, 9 May 1846, Board's Collections, F/4/2157 1845–46, file no. 103849, IOR; Summary of Proceedings Connected with the Government Cotton Experiments in the Southern Mahratta Country under the Bombay Presidency from 1830 to 1848, Bombay 1849, 31–32, IOR.
23. W. R. Cassels (1862) *Cotton: An Account of its Culture in the Bombay Presidency* (Bombay: Bombay Education Society's Press), p. 145.
24. J. Nisbet, Principal Collector Dharwar, to J. Bax, Bombay Territorial Department, 1 December 1828, IOR.
25. Cassels, *Cotton*, pp. 144–5.
26. Royle, *On the Culture and Commerce of Cotton*, p. 356.
27. J. P. Willoughby and D. A. Blane, Bombay Revenue Department, to Court of Directors, 20 August 1849. Board's Collections F/4/2378, 1848–50, file nos 126389–126393, IOR.
28. Shaw to Lumsden, 18 December 1847.
29. Willoughby and Blane to Court of Directors, 20 August 1849.
30. Shaw to Goldsmid, Bombay Revenue Department, 21 January 1848. Board's Collections, F/4/2317, file nos 120035–7, IOR.
31. Court of Directors to Government of Bombay, 30 April 1856. Board's Collections F/4/2676, file nos 181353–5, IOR; A. W. Silver (1966) *Manchester Men and Indian Cotton* (Manchester: Manchester University Press), p. 38.
32. Summary of Proceedings Connected with the Government Cotton Experiments in the Southern Mahratta Country, p. 74.
33. G. Wingate to S. Mansfield, Acting Collector of Dharwar, 29 September 1846, in Report by Captain G. Wingate, Superintendent of the Revenue Survey in the Southern Maratha Country on the Survey and Assessment of the Bunkapur Talook (hereafter Bankapur Survey Report), Bombay 1848, p. 6, IOR.
34. J. T. Francis, Assistant Superintendent Revenue Survey, to Wingate, 18 June 1846, in Wingate, Bankapur Survey Report, pp. 58–9.
35. J. M. Campbell, *Dharwar Gazetteer*, p. 273.
36. Francis to Wingate, Bankapur Survey Report, p. 49.
37. For an African example, see G. Carswell (2003) 'Food crops as cash crops: The case of colonial Kigezi, Uganda' *Journal of Agrarian Change*, 3 (4), pp. 521–51.
38. Wingate to Mansfield, Bankapur Survey Report, p. 5.
39. Campbell, *Dharwar Gazetteer*, p. 366.
40. D. Young, Assistant Superintendent Revenue Survey and Assessment, Southern Maratha Country, to G. Wingate, in Wingate, Bankapur Survey Report, p. 58.
41. Francis to Wingate, Bankapur Survey Report, p. 42.
42. Wingate to Mansfield, in Wingate, Bankapur Survey Report, p. 6.

43. J. MacLeod, Assistant Collector, Dharwar, to GOB, Revenue Department. Board's Collections, F/4/842 no. 22506-07: GOB Revenue Department 1825–26, pp. 8, 39–40, 43, IOR.
44. G. Wingate, Superintendent of Revenue Survey and Assessment in the Southern Maratha Country, to A. N. Shaw, Collector of Dharwar, 25 October 1844: Reports on the Revenue Survey Settlements of the Hoobullee, Nuwulgoond, Kode, and Dharwar Talookas of the Dharwar Collectorate, Bombay 1853 (hereafter Revenue Survey Reports). Selections from the Records of the Bombay Government no. 12, MF1/1014, p. 66, IOR.
45. Young to Wingate, Bukapur Survey Report, p. 50.
46. Ibid.; Campbell, *Dharwar Gazetteer*, p. 267.
47. Wingate, Revenue Survey Reports, p. 66.
48. *Dharwar Gazetteer*, p. 15.
49. Wingate, Revenue Survey Reports, p. 63.
50. Campbell, *Dharwar Gazetteer*, p. 271.
51. Ibid., p. 281.
52. Ibid., pp. 288–9.
53. A. Gibson, Superintendent Conservator of Forests, Bombay Presidency, to GOB, 9 March 1846. Board's Collections, F/4/2255, 1847–48, file no.11379, IOR.
54. J. Scott, Medical Board, to GOB, 7 February 1851. P/350/51, file nos 2753–8, IOR.
55. *Bombay Gazette*, 23 July 1870. Newspapers on microfilm, British Library, IOR.
56. S. Hazareesingh (2012) 'Cotton, climate and colonialism in Dharwar, western India, 1840–1880' *Journal of Historical Geography*, 38, pp. 10–11.
57. *Dharwar Gazetteer*, p. 253.
58. C. Walker, Cotton Department, to Government of Bombay, 30 April 1866. Bombay Revenue Collections 1866, IOR.
59. W. Walton, Cotton Inspector for the Southern Maratha Country, to E. P. Robertson, Collector of Dharwar, 30 July 1878. Administration Report of the Cotton Department (hereafter Cotton Department) 1877–78, Bombay 1878, p. 34, IOR.
60. *Dharwar Gazetteer*, p. 340.
61. Ibid., p. 308; Bombay Revenue Department to India Office, 8 July 1865. Bombay Revenue Collections, IOR.
62. Ibid., pp. 257, 266.
63. Cotton Department, 1869–70, pp. 25–6.
64. Ibid., 1868–69, p. 15.
65. Ibid., 1869–70, pp. 26–7.
66. Ibid., 1869–70, pp. 20, 35, 42.
67. Ibid., 1869–70, pp. 43–4.
68. Ibid., 1878–79, pp. 2, 4.
69. Ibid., 1872–73, p. 67.
70. F. Watson (1879) *Report on Cotton Gins and on the Cleaning and Quality of Indian Cotton*, part 1 (London: William H. Allen & Co.), p. 31.
71. *Dharwar Gazetteer*, p. 301.
72. Cotton Department, 1872–73, p. 57.
73. Ibid., 1880–81, p. 10.
74. *Dharwar Gazetteer*, p. 302.

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- 75. Cotton Department, 1874–75, p. 60.
- 76. Ibid., 1872–73, p. 63.
- 77. Ibid., 1876–77, p. 41.
- 78. Ibid., 1880–81, p. 10.
- 79. Ibid., 1872–73, pp. 62–3; 1874–75, pp. 61, 62, 64.
- 80. Ibid., 1878–79, p. 44.
- 81. Ibid., 1872–73, p. 63.
- 82. N. L. Peluso (2012) 'What's nature got to do with it? A situated historical perspective on socio-natural commodities' *Development and Change*, 43 (1), p. 80.