

The origins of timber plantations in India

by Brett M. Bennett

Abstract

This article assesses the origin and evolution of the Nilambur teak plantation in Malabar and the 'Australian' timber plantations on the Nilgiri plateau, two of the largest and most famous timber plantations in British India during the second half of the nineteenth century. The article argues that both timber plantations arose as part of the broader expansion of agricultural plantations and botanical gardens in southern India during the 1840s–1870s rather than developing from European forestry practices imported into India. By the end of the nineteenth century the difficulties and costs associated with establishing successful timber plantations outside of these two sites had led forestry officials to direct more resources towards regenerating India's indigenous forests. The success of the two pre-forestry plantations and the failure of plantations elsewhere in India suggests that forestry was less successful than has often been portrayed.

Government forestry policy in British India during the second half of the nineteenth century emphasized the conservation of indigenous forests and the establishment of timber plantations. Yet scholars writing about forestry have paid little attention to the history of timber plantations as opposed to forests in India. This lacuna reflects a more general historiographical oversight. Historical studies investigating 'Empire forestry', the term used to describe the rise and spread of state forestry in India and then throughout the British Empire, have tended to focus on the territorialization, management and regulation of indigenous forests rather than assessing plantations.¹ When historians of empire have commented on timber plantations, they usually refer to the success of the Nilambur teak plantation in Malabar, without indicating how its success was not replicated in other attempts to cultivate timber in both India and the Empire.² Some area studies specialists of India have drawn attention to the local social and ecological dimensions of timber plantations, but, again,

¹ For the question of the 'origins' of environmentalism, see Richard Grove, *Green imperialism: colonial expansion, tropical island Edens, and the origins of environmentalism, 1600–1860* (1995); Gregory Barton, *Empire forestry and the origins of environmentalism* (2002); Ravi Rajan, *Modernizing nature: forestry and imperial eco-development, 1800–1950* (2006).

² William Beinart and Lotte Hughes, *Environment and empire* (2007), p. 114; Barton, *Empire forestry*, p. 47; K. Sivaramakrishnan, *Modern forests: Statemaking and environmental change in colonial eastern India*

(1999) p. 129; Rajan, *Modernizing nature*, pp. 70, 85. Studies of forestry in southern Africa are one exception to this trend. Brett M. Bennett and Frederick J. Kruger, 'Ecology, forestry and the debate over exotic trees in South Africa', *J. Historical Geography* 42 (2013), pp. 100–09; Brett M. Bennett, 'Naturalising Australian trees in South Africa: climate, exotics, and experimentation', *J. Southern African Studies* 37 (2011), pp. 265–80; id., 'The rise and demise of South Africa's first school of forestry', *Environment and Hist.* 19 (2013), pp. 63–85.

they have tended not to situate them within the wider context of forest policy in India or the Empire.³

This article focuses on two timber plantations, those of teak (*Tectona grandis*) at Nilambur and of wattle (*Acacia*) and eucalyptus (*Eucalyptus spp.*) at Ootacamund, which were renowned in India and globally during the last three decades of the nineteenth century. Both plantations were established during a broader movement to create plantations of tea (1830s–1870s) and cinchona⁴ (1860s–early 1870s) on the Nilgiri plateau and coffee (1830s–1870s) in the surrounding districts of Wayanad, Coimbatore, Coorg and Malabar.⁵ These economic and environmental changes were part of an important global transformation that occurred between the 1840s and the 1870s, a period that John Darwin has identified as a seminal point in the formation of a Victorian British world-system of trade and empire.⁶ Darwin notes that these transformations included the expansion of expatriate British trading networks, especially in tropical and sub-tropical plantation industries, both within and outside of the formal British Empire. Southern India was one of the most dynamic and important of these locations because the region produced commodities that were in high demand in Britain and the Empire.

In India, the expansion of plantation agriculture created a mutually reinforcing dynamic that encouraged botanical and agricultural experimentation, which in turn led to larger tree-planting campaigns. At one level, the deforestation undertaken to make way for agricultural plantations led to environmental anxieties, prompting government officials to plant trees to replace declining forest cover.⁷ Newly acquired scientific knowledge transferred both across disciplines and between the different types of plantations.⁸ The knowledge required to grow

³ It should be pointed out that these are the exceptions, rather than the rule. See Kativa Phillip, *Civilizing natures: race, resources and modernity in colonial South India* (2003), pp. 71–131 and Deborah Sutton, *Other landscapes: colonialism and the predicament of authority in nineteenth-century south India* (2009), pp. 15–84. Most historians have rather focused on the ecological and social impacts of forestry. The main works on social impacts include Ramachandra Guha, *The unquiet woods: ecological change and peasant resistance in the Himalaya* (1989); Ramachandra Guha and Madhav Gadgil, 'State forestry and social conflict in British India', *Past & Present* 123 (1989); Marlene Buchy, *Teak and arecanut: colonial state, forest, and people in the Western Ghats* (1996); S. D. Gupta, 'Accessing nature: agrarian change, forest laws and their impact on an Adivasi economy in colonial India', *Conservation and Society* 7 (2009), pp. 227–38.

⁴ Chinchona was a South American native tree valued for the medicinal qualities of its bark.

⁵ Vera Antsey, *The economic development of India* (1977), pp. 284–6; Ranjit Gupta, 'Plantation labour in colonial India', in E. Valentine Daniel, Henry Bernstein and Tom Brass (eds), *Plantations, peasants and proletarians in colonial India* (1992); C. A. Bayly, *Indian society*

and the making of the British Empire (1988), pp. 144–5; Richard Tucker, 'The depletion of India's forests under British imperialism: planters, foresters, and peasants in Assam and Kerala', in Donald Worster (ed.), *The ends of the earth: perspectives on modern environmental history* (1988); Dane Kennedy, *Magic mountains: hill stations and the British raj* (1996), pp. 94–6; Paul Erik Baak, *Plantation, production and political power: plantation development in south-west India in a long-term historical perspective, 1743–1963* (1997).

⁶ See Richard Drayton, *Nature's government: science, British imperialism and the 'improvement' of the world* (2000), pp. 170–220; John Darwin, *The empire project: the rise and fall of the British world-system, 1830–1970* (2009), pp. 23–63.

⁷ See Michael Williams, *Deforesting the earth: from pre-history to global crisis* (2003), pp. 346–57. For the concept of environmental anxiety see James Beattie, *Empire and environmental anxiety: health, science, art and conservation in South Asia and Australasia, 1800–1920* (2011).

⁸ This was a more universal aspect of the history of plantations in India. See the recent study by Prakash Kumar, *Indigo plantations and colonial science in India* (2012).

various trees or shrubs – coffee, tea, and cinchona – often applied across species and was not confined to a single discipline or skill. Government officials and private individuals making and managing timber plantations did not see them narrowly through any single professional lens, such as ‘horticulture’, ‘forestry’ or ‘agriculture’. Rather, they drew on a mixture of local experience and methods devised in India, and accessed a range of professional and amateur scientific opinion.⁹

By focusing on the history of the Nilambur teak plantation and Australian plantations on the Nilgiri plateau this article revises existing interpretations of forestry in India. First, it argues that Germanic forestry science had almost no influence on the origin and success of these two plantations. Instead of looking to Europe, naturalists in India purposefully looked for insights into the natural world in order to understand how to create timber plantations in the tropics. The view put forth in this article challenges Ravi Rajan’s Euro-centric interpretation of the origins of forestry in India, which in turn draws from James Scott’s well-known analysis of the origins and problems of Prussian timber plantations.¹⁰

In *Seeing like a state*, Scott argued that the human desire to make nature in the image of human conceptions of orderliness and efficiency led Prussian foresters to create pine plantations that became diseased in the nineteenth century owing to poor planning. His simplified view of plantations now informs many historians’ understanding of the rise of timber plantations globally. Yet this Euro-centric view of the rise of timber plantations does not adequately take into account the messier history of tropical plantations, which rarely conformed to human desires, and where developments were conditioned by tropical conditions on the frontier of empires. Undoubtedly, the Enlightenment and German methods of forestry later played roles in determining the political economy of timber plantations, but I argue here that they had little impact on the methods used for creating and managing the first and second generation of many types of tropical plantations.¹¹ The article therefore agrees in principal with Richard Grove’s argument that both a pre-existing South Asian and an imperial botanical tradition shaped the rise of forestry in India in years between about 1850 and 1870,¹² but it differs in regards to the weight it gives to the contribution of certain indigenous agents and the legacy of attempts to establish plantations before 1850.

Second, the article argues that the attempt to replicate the success of these two plantations elsewhere in India failed, and the wider project of making timber plantations was eventually abandoned in order to focus on the regeneration of natural woods. Ootacamund and Nilambur’s unique climatic conditions, the integration of key botanical and economic networks, and the idiosyncratic methods developed locally in order to cultivate specific plantations could not be easily translated to other sites. The expense of creating plantations and the difficulty in establishing viable plantations led the Indian Forest Service to abandon the goal of replicating

⁹ For a discussion of this in the tea plantations of Assam, see Jeyeeta Sharma, ‘British science, Chinese skill, and Assam tea: making empire’s garden’, *Indian Economic and Social Hist. Rev.* 43 (2006), pp. 429–55.

¹⁰ Rajan, *Modernising nature*; James C. Scott, *Seeing like a state: how certain schemes to improve the human condition have failed* (1998).

¹¹ For a discussion of the continuities from Indian to British colonial plantation agriculture, see Baak, *Plantation, production and political power*. For an intellectual and scientific history of ‘improvement’ in relation to botanical gardens, see Drayton, *Nature’s government*, pp. 1–220.

¹² Grove, *Green imperialism*, pp. 309–473.

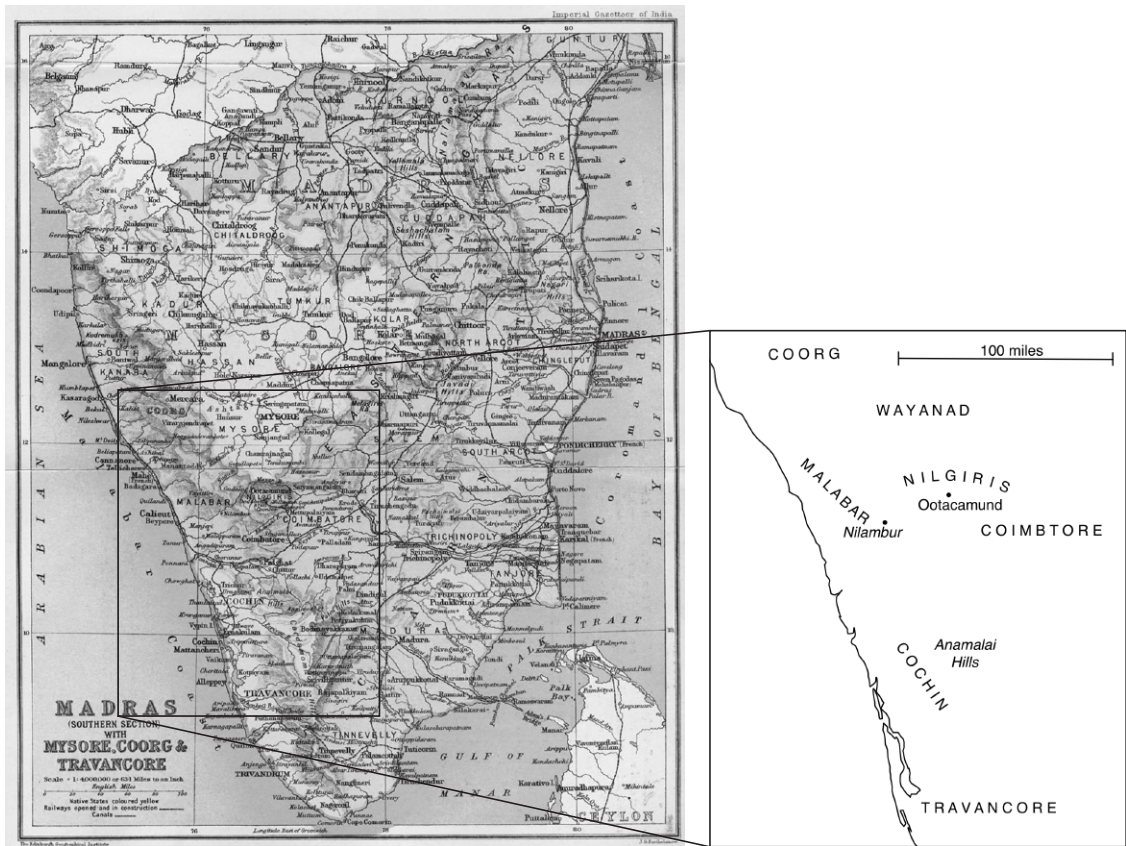


FIGURE 1. Madras (Southern section) with Mysore, Coorg, and Travancore, with sketch map showing places and districts mentioned in the text

Source: J. G. Bartholomew, *The imperial gazetteer of India*, XVIII (New edition, 1908), p. 250.

teak and eucalyptus in plantations throughout India and to focus its plantation efforts on a few key sites using techniques that were based on local experience rather than European theories or practices. European forestry practices and methods had an insignificant influence on India's timber plantations before 1900.

I

Teak (*Tectona grandis*) was the first species of tree that British East India Company officials sought to conserve in indigenous forests and grow in timber plantations. Its timber served numerous purposes. A fully-grown teak tree produces hard, resilient timber that resists the attack of ants and other pests and can be used to build structures that withstand long-term exposure to saltwater and humid, insect-prone tropical climates. Teak was prized around the Indian Ocean rim as a building material.

In southern India (Figure 1), teak grew sporadically amongst other trees in tropical forests along the western edge of the Western Ghats, primarily in the regions of Travancore, Cochin,

and Malabar (which today are part of Kerala).¹³ Indian merchants cut and sold teak for local use and for sale in the Indian Ocean markets at Cochin and Bombay during the late eighteenth and early nineteenth centuries.¹⁴ Arab and Indian buyers valued the teak grown in southern India more than teak from Burma; southern Indian teak commanded a healthy price, providing an economic incentive to harvest the finite supply of teak at an unsustainable rate.

The spoils of war during the last decade of the eighteenth century gave Britain access to many of southern India's large teak forests. The East India Company gained formal control of many of the teak forests of Malabar when it took possession of large swaths of the region in 1792 at the end of the Third Anglo-Mysore War.¹⁵ In 1799, the Company also claimed Wayanad after the complete defeat of Tippu Sultan. Despite annexation, the Rajah of Nilambur retained large swaths of land including many of the forests as his private property. To the south of Malabar were located the teak-bearing princely states of Cochin and Travancore. Native landowners and princes maintained powerful control over access to teak, a constraint that eventually encouraged British government officials to attempt to grow teak in plantations.

Strategic demands for naval timber during the Napoleonic War led the East India Company to pass legislation that limited the cutting of teak in southern India. British Indian elites worried that progressive deforestation was leading towards a timber famine, a situation that would hurt Britain's naval efforts against the French navy. Reports in 1804 by Philip Dundas to Lord Wellesley, the Governor General of the East India Company (1798–1805), warned that the Malabar teak forests 'had been nearly exhausted'.¹⁶ In 1806 the Madras Presidency appointed a conservator, Captain Watson, to establish government control over these forests. Watson established an unpopular government monopoly over the forests that permitted only government-approved merchants to cut down trees. His policy sought to limit the cutting of teak, but it did nothing to create new forests by replanting trees after they were harvested. But in 1823 the Governor of Madras, Thomas Munro, repealed these laws because they violated the principles of *laissez-faire*. By doing so, Munro ended the first state forestry programme in India.¹⁷

East India Company officials in the first half of the nineteenth century recognized that they needed to grow teak to maintain supply because the natural stock was dwindling. Officials did not view teak as being different from other non-timber tropical plants. In their mind it was just another marketable crop that could be harvested from wild stocks, but could also be cultivated in a plantation to make up shortfalls in supply. The plantation as a system evolved alongside European colonial expansion, and reflected an economic trend towards the intensification of land use that began well before the Enlightenment and continued after it.

Physicians, military officers, botanists, horticulturalists and arboriculturalists all experimented with growing teak. A succession of botanists at the botanical garden in Calcutta – Colonel Robert Kyd (1746–93), William Roxburgh (1751–1815) and Nathaniel Wallich (1786–1854)

¹³ For an excellent history of teak in North Canara district, see Buchy, *Teak and arecanut*.

¹⁴ Anne Bulley, *The Bombay country ships, 1790–1833* (2000), pp. 32–3.

¹⁵ The British opted for direct control rather than indirect rule over the cinnamon trade. See Bayly,

Indian society, pp. 62–3.

¹⁶ Grove, *Green imperialism*, p. 394. Dundas later served as Governor of Prince of Wales Isle (now Penang) in 1805–7.

¹⁷ *Ibid.*, p. 397.

– trialled teak in Bengal, Orissa, and Bihar.¹⁸ As Grove noted, ‘the plantation methods he [Roxburgh] adopted were developed by him in India and were not derived from German or other European precedents’.¹⁹ Whilst it is important not to overstate attempts to grow teak prior to the 1840s, we should also note that Roxburgh’s methods, however innovative, failed.

Roxburgh’s failure mirrored almost every attempt to grow teak in plantations in India in the first half of the nineteenth century. The Commissioner of Forests in Tenasserim, Thomas Latter, noted in 1848 that, ‘[i]t is well known that every attempt at artificial sowings [of teak] have proved a failure’.²⁰ Widespread failures led would-be growers to debate why the species was so difficult to regenerate and maintain. People had to learn what climate teak grew in, what soils suited it best, how to germinate its seeds, and how to space and thin teak trees. Over time it was recognized that teak did not grow well in cooler tropical climates, such as St Helena in the south Atlantic, and required warmer temperatures, such as existed in southern India and Burma.²¹

Rather than ‘seeing like a state’, experimenters tried to see like nature.²² Latter, one of India’s leading experts on teak, suggested simply that people follow nature: ‘I would, therefore, recommend that in the case of artificial sowings, the process of nature be imitated as much as possible’.²³ Humans could only apply rationalistic models after they sufficiently understood and could control nature. Whereas pines in northern Europe were easily established in plantations, tropical trees were not so easy to plant and grow. Some suggested burning seeds before planting them whereas others called for boiling.²⁴ No one knew how far apart to space the trees or whether or not to thin them, and if so, at what age. Hugh Falconer, an amateur botanist and physician, believed teak required open spacing. An enquiry in the early 1850s by Falconer noted that ‘the over-crowding of the trees, by close planting, was at the root of all the failures’ of plantations in Bengal.²⁵ Others recommended inter-planting other tropical crops with teak.²⁶ No consensus existed on the methods by which teak could be grown because at this date no one had grown it successfully in a plantation.

A solution appeared in 1840s from the efforts of H. V. Conolly, Collector of Malabar and Chattu Menon, a Nair *Tahsildar* and Conolly’s assistant.²⁷ Together they created India’s first

¹⁸ Grove, *Green Imperialism*, pp. 405–11.

¹⁹ *Ibid.*, p. 406.

²⁰ Thomas Latter, ‘Extract of report on the teak forests in the Tenasserim Provinces’, in *J. Agricultural and Horticultural Soc. of India* 6 (1848), p. 167.

²¹ Francis Duncan called for the planting of teak in St. Helena in *A description of the island of St Helena; containing observations on its singular structure and formation and an account of its climate, natural history, and inhabitants* (1805), pp. 181–2. By 1815 attempts to grow teak from seed sent by Roxburgh had failed. See Alexander Beatson, *Tracts relative to the island of St. Helena; written during a residence of five years* (1815), p. 189.

²² I refer here to the view of eighteenth- and nineteenth-century Prussian plantations as reflecting the idea that nature would reflect human ideas. This idea

has been advocated most powerfully by James Scott’s influential book on the failure of human efforts to restructure nature and human society using the ideals of the Enlightenment. See Scott, *Seeing like a state*, ch. 1.

²³ Latter, ‘Extract of report on the teak forests’, p. 168.

²⁴ I discuss this below, p. 104.

²⁵ Cited in Hugh Cleghorn, *The forests and gardens of south India* (1861), p. 323.

²⁶ ‘Directions for cultivating teak’, *Trans. Agricultural and Horticultural Soc. of India* 2 (1836), p. 46.

²⁷ A *Tahsildar* is a native name for a tax collector or sub-official who worked for the British government. In this case, Menon served as the Indian in charge of the day-to-day management of the plantation. *Nairs* are a Hindu cast that were especially prevalent in Malabar.

successful plantations of teak in Malabar in 1843. In 1852, Falconer, for the first time, could happily confirm to the Bengal government in report on teak: 'That the forests [of teak] can be renewed by planting, I consider to have been fully established ... by the results attained on the Malabar coast'.²⁸ The Rajah of Nilambur, who owned most of the land in the region, would not sell any to the British, so the plantation site near the Nilambur River had been purchased from a temple in financial need.²⁹

Like others before him, Conolly had a difficult time getting teak seed to germinate. At the recommendation of Menon, Conolly decided to lay hay over the seeds and burn them, so that the fire only singed the seeds.³⁰ Menon noted that teak seeds shed their tough coating by fires, and thus by burning the seed artificially, the seed might germinate. Some seeds germinated, but the fire only slightly singed most of the seeds, and they abandoned the attempt. Conolly and Menon then experimented with boiling the seeds. Marquis Tweeddale, then Governor of Madras (1842–8) and the first early supporter of Conolly, noted that this helped 'to produce the same effect by the heat so generated as the constant fires in the jungle do on the seeds which there germinate'.³¹ Eventually the pair grew teak successfully by soaking seeds first in water before broad sowing them under leaves in plenty of light.³² After transporting the successful saplings from a nursery, they planted them approximately six to nine feet apart in rows. These methods remained the standard nursery and planting practice into the twentieth century. British foresters continued to recognize the influence of Menon, crediting him with discovering how to germinate teak seeds. After Conolly was hacked to death in 1855 by three revolting Mappilas, Menon continued to direct planting at Nilambur until 1862.³³

By 1860–61 the size of the plantations had expanded to 1100 acres, when the oldest plantations, then over 15 years old, were 'progressing favourably'.³⁴ In 1862 a Scottish forester, J. Ferguson, took over the operations of the Nilambur plantation.³⁵ A million and a half trees had been planted out before he arrived.³⁶ The plantations, he felt, required pruning and thinning. Nilambur faced a shortage of labour made worse by its location, the supposed caste prejudices of the local Hindu caste of Nairs 'who prefer their own caste to any other', and the opening of the Western Ghats to plantation agriculture, which 'drains a great amount of labour from the district'.³⁷ When possible, Ferguson employed Indians to thin the trees, and he began selling

²⁸ Ibid., p. 36.

²⁹ Brandis, *Indian forestry*, p. 24. Grove incorrectly states that the Rajah of Nilambur recommended that Conolly plant teak. In fact, Conolly followed the Revenue Board's orders and successive plantation superintendents complained about the Rajah's lack of support. Grove, *Green imperialism*, p. 457.

³⁰ Cleghorn, *Forests and gardens of south India*, p. 304.

³¹ An extract from 'Minute by the Marquis of Tweeddale, 8 Dec. 1846', in Hugh Falconer, *Selections from the records of the Bengal Government no. 9. Report on the teak forests of the Tenasserim Provinces* (1852), pp. 244–5.

³² Brandis, *Indian forestry*, p. 24.

³³ Cleghorn, *Forests and gardens of south India*, p. 11; R. McIntosh of the Indian Forest Service reflected on the important influence of Menon, 'Chattu Menon soon overcame the difficulty experienced in getting the seed to germinate, and the method adopted by him is, with a few minor modifications, retained to this day'. R. McIntosh, 'The Nilambur teak plantations', *Indian Forester* 16 (1905), p. 129.

³⁴ *Report of the conservator of forests for the official year 1860–1* (1861), p. 1.

³⁵ *Report of the conservator of forests for the official year 1861–62* (1862), pp. 39–40.

³⁶ Ibid., p. 54.

³⁷ *Report of the conservator of forests for the official year 1862–63* (1863), p. 47.



FIGURE 2. Teak plantation in Nilambur

Source: R. S. Troup, *The work of the forest department in India* (1917), p. 20.

thinnings at a government depot in Calicut. In 1863 the depot 'was not known at any distance' and 'no Arab traders were present', and so the revenue was lower than hoped.³⁸ A shortage of labour also hindered his ability to have teak cut and floated down the river to market.³⁹ In particular, Ferguson complained about the Rajah of Nilambur's lack of support. He noted that, '[t]he Rajah's word, too, is law, and neither the Rajah, nor any of his people, give the assistance that might be expected from them'.⁴⁰ Labour shortages continued throughout the 1860s.⁴¹ But from the middle years of the 1860s, Arabs began to attend the auctions, providing revenue to pay for the running of Nilambur.⁴²

Ferguson followed local planting precedents rather than drawing on European practice. In Scotland, where Ferguson grew up and worked, there was no consensus on thinning or spacing.⁴³ Most foresters in Scotland planted pine trees approximately three and a half to four feet apart and hardwoods approximately four to five feet apart.⁴⁴ But in the plantations at

³⁸ *Report of the conservator of forests for the official year 1863-64* (1864), p. 11.

³⁹ *Ibid.*

⁴⁰ *Ibid.*

⁴¹ *Report of the conservator of forests for the official*

year 1866-67 (1867), p. 62.

⁴² See *Madras revenue register 2* (1868), p. 68.

⁴³ William Gilchrist, 'On the thinning of plantations', *Trans. Royal Arboricultural Soc.* 5 (1869), p. 43.

⁴⁴ *Ibid.*, pp. 43-5.

Nilambur the trees were between six and nine feet apart and underwent a stringent thinning and pruning regime undertaken by Indian labourers. Ferguson also studied other experiments with teak, looking in particular to Burma, where foresters studied and debated many of the practices of the Karen, such as multiple cropping and slash and burn plantations. In 1867 the Madras government approved the experiment of planting food crops amongst the teak saplings during their first year based upon the Burmese Karen methods of *taungya* (slash and burn agriculture).⁴⁵ But this method was declared a failure in 1869, and Ferguson stopped it.⁴⁶ More mixed species experiments continued in the 1870s to 1890s, as foresters continued to experiment.

The success of the Nilambur plantation and the recurring government fears about a looming shortage of teak led Hugh Cleghorn, the first conservator of forests in Madras, to suggest in 1867 that the Forestry Department expand plantings at Nilambur and also ten miles away at Nellicottah. Cleghorn suggested that the Madras government create a subordinate training school at Nilambur for the whole of Madras. This would serve to educate both Indians and Europeans who 'might be always under the regular training of the Superintendent'.⁴⁷ Successive Secretaries of State for India, Stafford Northcote and the Duke of Argyll approved of Cleghorn's idea.⁴⁸ Yet the Madras government abandoned the idea in 1873, even after Argyll urged them to reconsider, when the government began discussing the establishment of a forestry school for Indians.⁴⁹ The failure to establish the school reflected the relative weakness of foresters in Madras, a province dominated by government officers who were concerned about the social ramifications of applying forestry laws in the communal land tenure regions of south India.⁵⁰

Ferguson and his successor Gordon Hadfield (1883–1894) continued to experiment with mixed teak plantations inter-planted with Brazilian rubber (*Hevea brasiliensis*) and West Indian mahogany (*Swietenia mahagoni*). The desire to grow multiple crops stemmed from two factors. First, foresters and botanists began to recognize in the 1870s that monoculture teak plantations had higher rates of disease and pest infestation than natural forests. Conservator Captain Beddome noticed Nilambur's first pests in 1867, with various infestations of disease and bugs breaking out in the following years.⁵¹ In his influential *A manual of Indian timbers* (1881), J. Sykes Gamble cautiously pointed to the destruction of monoculture teak plantations:

No safe speculations can be formed regarding the future of a pure Teak forest like that of Nilambur. In its natural state Teak does not grow alone, but is associated with bamboos and a variety of other trees; and it is impossible to foresee the risk of damage by storms, insects, disease, or other causes to which pure Teak forests may be exposed.⁵²

⁴⁵ See British Library, India Office Records (hereafter IOR), L/E/3/771, Conservator of Forests to the Secretary to Government, Revenue Department, 25 Oct. 1867.

⁴⁶ *Report of the conservator of forests for the official year 1868–1869* (1869), p. 25.

⁴⁷ Ibid.

⁴⁸ Ibid.; IOR, L/E/3/767, Duke of Argyll to Governor in Council, 25 Feb. 1869.

⁴⁹ IOR, L/E/3/767, Argyll to Governor of Madras, 30 Apr. 1873.

⁵⁰ See Madhav Gadgil and Ramachandra Guha, *This fissured land: an ecological history of India* (first edn, 1993), pp. 124–32.

⁵¹ IOR, L/E/3/771, Plantation Progress Report, Conservator of Forests to the Secretary to Government, 25 Oct. 1867.

⁵² J. Sykes Gamble, *A manual of Indian timbers: an account of the structure, growth, distribution, and qualities of Indian woods* (first edn, 1881), p. 289.

Second, Ferguson and Hadfield also sought to increase the revenue production of the plantations. New exotic species offered the opportunity to grow multiple species with a much quicker rotation than teak (the full teak cycle was assumed to be between 60 and 120 years). Ferguson introduced 28 rubber trees (*Hevea brasiliensis*) in the plantation in 1879 after receiving the seeds from the Royal Botanical Gardens in Peradeniya (Ceylon).⁵³ The plantation superintendents also introduced other rubber trees (*Castilloa elastica* and *Manihot Glaziovii*) into the plantations.⁵⁴ In 1872 Ferguson started planting Jamaican mahogany seeds amongst the teak.⁵⁵ These experiments, like the rubber, proved less than successful.⁵⁶

The success at Nilambur spurred on the establishment of experimental Forestry Department plantations throughout the rest of Madras. District conservators started experimental plantations in Sigur, North Canara, South Canara, the Annamalai hills, and Cuddapah in the 1860s and 1870s.⁵⁷ As a general rule, these experiments did not provide promising results. Labour shortages, different soil types and climates, and the remoteness of many locations hindered the success of trials. One forester in the Annamalais reported, 'we labour under the following disadvantages, viz., a very feverish locality, scarcity of labour and 40 miles of land carriage'. Difficult social relations between British foresters and Indian sub-officials often made the protection of plantations against the encroachment of cattle or nearby residents difficult. In South Canara native subordinates ignored forestry regulations requiring the protection of trees.⁵⁸ When sites did succeed, the resulting plantations cost too much to be economically viable.

Attempts to establish plantations of teak failed across most of the Indian subcontinent. Except for some successes with the *taungya* (slash and burn) plantations in Burma, the vast majority of experimental teak plantations failed entirely or could not be financially justified by the projected income. The extent of government plantations actually declined in the early twentieth century when the Indian Forest Service abandoned many plantations. In 1907, the IFS recorded 134,785 acres of plantations – including taungya forests – a decline of over 10,000 acres from the previous year.⁵⁹ The decision was made to focus on improving existing natural forests because of concerns about the dangers of growing monocultures.⁶⁰

Artificial methods of regeneration proved to be too costly to maintain, except at Nilambur. By the late nineteenth century foresters in India had decided to manage teak forests through natural reproduction rather than through the creation of plantations.⁶¹ The failure of teak plantations, coupled with the high costs associated with buying or leasing land, clearing forests, and paying for labour, led forestry officials to discontinue most efforts. The plantations

⁵³ These did not thrive. See R. L. Proudlock, *Report on the rubber trees at Nilambur and at Calicut, South Malabar* (1908), p. 6.

⁵⁴ *Ibid.*, pp. 49–50.

⁵⁵ The Jamaican tree was introduced to Madras in 1872. Most of the early plantings failed. See the discussion in 'Cultivation of mahogany tree', *Indian Gardener* 1 (1884), p. 319.

⁵⁶ Even after failures, some foresters wanted to continue to plant mahogany. See Berthold Ribbentrop, 'Note on the working plan for the Nilambur valley teak

plantations', *Indian Forester* 24 (1899), pp. 165–6.

⁵⁷ See the government report on plantations in *Annual administration report of the forest department for the official year 1877–78* (1879), pp. 41–4.

⁵⁸ *Ibid.*, p. 5.

⁵⁹ S. Eardley-Wilmont, *Report of forest administration in British India for the year 1906–1907* (1908), pp. 14–15.

⁶⁰ *Ibid.*, p. 13. Also see Raymond Bryant, *The political ecology of forestry in Burma, 1824–1994* (1996), p. 111.

⁶¹ Eardley-Wilmont, *Report*, pp. 14–16.

at Nilambur remained the exception to this rule. Responding to Sir William Henry Gladstone's question about the success of plantations in India at a parliamentary enquiry, William G. Peder, Secretary of the Revenue, Finance, and Commerce Department for the India Office from 1879–1888, explained to the House of Commons committee on forestry in 1884,

[t]here have been some very successful instances of artificial plantation in India; the great teak forest at Nilambur in Madras is an instance. The experiment has generally been made under favourable conditions, but it costs a great deal of money.⁶²

The example of Nilambur remained the great exception to the rule of the failure of teak plantings. In Gamble's revised *Manual of Indian timbers* (1922), he noted the general pessimism that Indian foresters felt about plantations but noted, with a hint of optimism, that Nilambur might still provide a path for future teak plantations: 'Teak plantations, however, have been largely, perhaps too largely, condemned in India, the large one at Nilambur being probably the only one of any importance which has been maintained and gradually increased'.⁶³

For most of the nineteenth century the Nilambur plantation was managed according to Conolly, Menon, and Ferguson's methods. The introduction of identifiably 'continental' forestry methods in Nilambur can be dated to 1896 when the forester P. S. Lushington drafted and published the first working plan for the plantations.⁶⁴ He based his working plans upon German working plans.⁶⁵ The forests, he suggested, should be managed as a 'high forest' (a term to indicate a fully mature forest dominated by a single commercially valuable species) by clean felling the trees and then artificially regenerating the plantations anew.⁶⁶ Berthold Ribbentrop, the Inspector General of Forests in India, praised the working plan drawn up by Lushington, 'whose theoretical and practical knowledge is fully evidenced on every page of his excellent report'.⁶⁷ But the influence or importance of German working plans on the management of the plantation should not be overstated. The plan merely provided an analysis of the amount of timber within the plantation and suggested when the trees should be cut down. The first and one of the most crucial aspects of making teak plantations – the method of sowing seeds and transplanting saplings – remained unquestioned: Conolly and Menon's methods remained. No new study of planting need be done because as Ribbentrop noted, '[t]he art of planting teak successfully has, in the course of years, been thoroughly acquired'.⁶⁸

Teak plantations in southern India in the nineteenth and early twentieth century, except for the success at Nilambur, were not successful. These failures led to changes in India-wide forestry policies. Instead of a policy oriented to both conserving forests and creating new plantations, the Indian Forest Service more narrowly focused on managing indigenous forests

⁶² BPP, 1884–5, VIII, *Report from the select committee on forestry, together with the proceedings of the committee, minutes of evidence* (1884), p. 11.

⁶³ J. Sykes Gamble, *A manual of Indian timbers: an account of the structure, growth, distribution, and qualities of Indian woods* (sec. edn, 1922), p. 528.

⁶⁴ P. S. Lushington, *Report and working scheme of the Nilambur teak plantations* (1896).

⁶⁵ The theoretical German working plan was based upon a quantified analysis of the growth rates of

valuable trees, and it recommended the type of harvesting and silvicultural regime that should be implemented to harvest a sustainable amount of timber in perpetuity. A working plan provided for the past, present, and future of a forest.

⁶⁶ Lushington, *Report and working scheme*, pp. 66–7.

⁶⁷ Berthold Ribbentrop, 'Note on the working plan', p. 163.

⁶⁸ *Ibid.*, p. 168.

through natural reproduction. The methods of planting, germination, transplanting, and thinning teak remained almost entirely unchanged from the 1840s when Conolly and Menon worked together to discover how to grow teak. The plantations' spacing and thinning regime was based upon local experimentation. Other experiments throughout Madras mirrored the methods used at Nilambur. But the less favourable environmental, social, and financial conditions elsewhere in the Madras Presidency made teak plantations other than the one at Nilambur unviable.

II

The Nilgiri plateau is a highland that bridges the Western Ghats and Eastern Ghats in southern India.⁶⁹ The mountains average approximately 6500 feet in elevation. The British city of Ootacamund, on the Nilgiri plateau, became a fashionable health resort from the 1830s, after the region's 'discovery' by the assistants of the collector of Coimbatore in 1818.⁷⁰ Ootacamund's elevation (approximately 7300 feet) made the site efficacious for Britons seeking respite from the heat of the sweltering, humid plains below. The location became so popular as a summer resort that the Madras government moved its summer capital there from 1861.⁷¹ British settlers reshaped both the ecological and architectural aesthetics of Ootacamund and the surrounding environs, making neo-gothic Victorian churches, building Tudor-styled houses, and founding libraries and other public institutions frequented by the Britons who visited and retired in and around the city.⁷² Prior to Ootacamund's 'discovery' by the British, the Toda and Badaga inhabited the area. The Toda, a group of probably less than 1000, tended to their buffalo and the Badaga, a larger tribal people, practiced shifting agriculture called *bhurty*.⁷³ During the mid- to late nineteenth century both groups lost many of their original lands owing to the rapid expansion of plantation agriculture, British settlement, and the reservation of forests in across the plateau.⁷⁴

Beginning in the 1830s and '40s, British residents on the Nilgiri plateau began to plant exotic trees that they thought might grow in the cooler climate and higher altitude. The most successful trees came from some of the coolest regions of Australia, the mountainous parts of Victoria and Tasmania. Various species of *Acacia* and *Eucalyptus* became popular because they grew rapidly, created a new aesthetic landscape, and led many to hope that their hardwood could provide railway sleepers, building material, and an almost unlimited supply of firewood for the growing population. Ootacamund's residents began planting *Acacia melanoxylon* and *A. dealbata* first in the 1830s, the seeds probably coming from Tasmania.⁷⁵ Captain (later

⁶⁹ For a description of the region see W. Francis, *Madras district gazetteers: the Nilgiri* (1908), pp. 1–5.

⁷⁰ See Lucy Veale, 'Transforming the tropics: the creation of British space in India', presented at Negotiating Space Conference, Nottingham University, 16 June 2008, p. 1.

⁷¹ For its early history see Kennedy, *Magic mountains*, pp. 20–22.

⁷² For a post-Raj British reminiscence of the history of Ootacamund, affectionately referred to as 'Ooty', see

Panther Downes, *Ooty preserved: a Victorian hill station in India* (1967).

⁷³ In 1871 the Badaga were reported to have 13,922 houses in the area. See W. Francis, *Madras district gazetteers: the Nilgiri* (1908), p. 131.

⁷⁴ This is an important part of the history of the region that is covered by other scholars. See Kennedy, *Magic mountains*, pp. 182–4; Phillip, *Civilizing natures*, pp. 95–6; Sutton, *Other landscapes*, pp. 134–5.

⁷⁵ Francis, *Nilgiri*, p. 213.



FIGURE 3. View from above Sylk's Hotel, Ootacamund, c.1880

Source: Unidentified Artist, Untitled (Sylk's Hotel, Ootacamund, Mysore-Ooty, India), c.1880. Reproduced by permission of Harvard Art Museums/Fogg Museum, Gift of the Melvin R. Seiden Collection, P2000.96; Photo Copyright: Imaging Department © President and Fellows of Harvard College.

General) Frederick Cotton of the Madras Engineers planted the first known *Eucalyptus globulus* in Ootacamund in 1843.⁷⁶

Residents began to comment on the rapid spread of Australian trees in the early 1850s. W. G. McIvor, a horticulturalist trained at Kew who headed the Ootacamund botanical garden from 1848 to 1876, noted in his 1852 report that 'the greatest variety of timber and ornamental trees are from Australia. Australian plants of all kinds thrive particularly well here, which is a mark of the similitude of this climate and soil to that of Australia'.⁷⁷ The botanical report described the rapid growth of *Eucalyptus* in glowing terms. One 'blue gum' supposedly grew to be 'upwards of 50 feet high, with a circumference at the best of four feet five inches'.⁷⁸ McIvor

⁷⁶ This date is well attested in numerous official gazettes, forestry publications, and personal memoirs.

⁷⁷ *Report on the horticultural gardens, Ootacamund, Neilgherry Hills* (n.d.). The published letter was dated 23

June 1852.

⁷⁸ *Report of the government botanical and horticultural gardens Ootacamund for the year 1854-55* (1856), p. 4.

believed that the blue gum ‘had the advantages of being clean in its grain, and easily wrought into any shape’ in addition to being both strong and resistant to the attack of insects.⁷⁹ *Acacia melanoxylon*, the ‘Black Wattle’, became the most popular of *Acacia* species because it grew so rapidly.⁸⁰ Government officials and private individuals alike planted Australian trees ‘on these Hills for ornament and shelter’.⁸¹

The botanical garden at Ootacamund served as the first major centre for both the distribution of plants and knowledge about them in the Nilgiri plateau and across India generally. Kativa Philip notes that the establishment of botanical gardens laid the ‘institutional and epistemological bases of colonial power’ for expansion of agriculture and European settlement in the highlands.⁸² In terms of forestry, the garden served to distribute Australian and other exotic trees throughout the region and India.⁸³ The Garden produced knowledge in the forms of governmental reports, pamphlets, and, through the public garden, grounds that highlighted exotic and native species.

Yet disseminating this knowledge proved difficult. McIvor was dissatisfied because he felt that the British residents and government officials in the region lacked an accurate knowledge of the experimental results of his garden. The garden’s multiple experiments produced extensive results but ‘as a knowledge of these [results] is not generally diffused, the public reap little or no advantage from them’. McIvor told the government that ‘the want of a better knowledge of Horticulture’ could have contributed to three-fourths of the failures in the region.⁸⁴ Matching species successfully to particular localities and conditions required extensive trials, and only rarely did an early introduction provide the basis for future success.

McIvor’s efforts fitted within a mosaic of experimentation and acclimatization which occurred in India and throughout the British Empire. British officials and private capitalists experimented with valuable or potentially valuable species. The most suitable candidates at the time were tea, coffee, teak, and later cinchona, West Indian mahogany, and rubber. The size of exotic plantations grew rapidly in the middle decades of the century as a result of government-sponsored experiments and the activities of private planters financed by British and Indian capital. Experimental knowledge was relatively integrated. Questions about planting – how to germinate seeds, when and how to plant them, how to tend them – cut across then nascent professional scientific boundaries. For example, McIvor worked with tea and coffee planters, directed the government plantations of cinchona, provided the seeds and saplings for government plantations of Australian trees, and took part in larger Indian and imperial discussions about economic development. Foresters worked with botanists, botanists with private planters, and *vice versa*.

Between the 1850s and 1870s foresters often followed rather than led efforts to make timber plantations on the Nilgiri plateau. The professional and bureaucratic boundaries between the botanical garden, the Forestry Department, and other civil officers such as district collectors

⁷⁹ Ibid., p. 4.

⁸⁰ Ibid., p. 9.

⁸¹ Ibid.

⁸² Phillip, *Civilizing natures*, p. 254.

⁸³ See *Annual report on the Sind forests for the year 1858–59* (1859), p. 87; B. H. Baden-Powell, *Handbook of*

the economic products of the Punjab (2 vols, 1868–72), I, p. 565.

⁸⁴ *Report of the government botanical and horticultural gardens Ootacamund for the year 1854–55*, p. 13.

remained vaguely defined. Botanists, civil officers, arboriculturalists, and foresters all officially worked for the government to create and manage plantations and conserve indigenous forests. They all reported to the Board of Revenue in Madras. Hugh Cleghorn, an eminent Scottish physician and botanist who previously worked in Madras, became the first conservator of forests in Madras when the Forestry Department was founded in 1856.⁸⁵ At its founding, none of the Forestry Department staff had previously studied German or French forestry, although Cleghorn had an expert knowledge of Scottish arboriculture. The Revenue Board also created a Jungle Conservancy Fund in 1859 to finance the creation of firewood plantations around villages in each district. This financed the foundation of many of the plantations created around the Nilgiri plateau in the 1860s. In 1872 a Jungle Conservancy Department was founded and staffed by the civil officers of the district. The Jungle Conservancy Department amalgamated with the Forestry Department in 1883.⁸⁶

These overlapping divisions of power sometimes led to conflict over who had the authority to provide seeds, saplings, and knowledge. The botanical gardens (first at Ootacamund and then at Coonoor) staked their claim as the main supplier of nursery stock for government plantations. In 1858, the government of Madras asked that the head botanist of the Ootacamund garden supervise the plantations and woods for the Nilgiri plateau, including Kuhutty and Coonoor, approximately 12 and 8 miles away.⁸⁷ Cleghorn argued that another officer, appointed specifically to attend to government plantations, should take this job, leaving McIvor to focus on the garden.⁸⁸ McIvor, however, agreed with the suggestion of the council and began to prepare the required nursery in 1859. McIvor sought to maintain his control over the local plantations by controlling the supply of nursery plants. Whereas Cleghorn wanted specific nurseries located by the government plantations, McIvor noted, 'this would in great measure have removed the plants from my immediate superintendence when they required the greatest care'.⁸⁹ In the end, the government decided to in March 1859 to maintain McIvor's control over the supply of nursery trees.⁹⁰

Forestry officers followed McIvor's method for producing and transplanting saplings throughout the second half of the nineteenth century. His ingenuity and thrift also ensured that the penurious Revenue Board maintained his privilege of supplying *Eucalyptus* and *Acacia* nursery trees for government plantings during his tenure. He first planted seeds in a seedling pot (with multiple seeds being grown in a single pot). He then transplanted the small saplings into a three-inch pot 'with good rich soil', which he then put into a growing house for a month to let the root structure grow.⁹¹ After a month he took the saplings out of pots, 'wrapped them in moss', before then planting them in a four-inch bed of moss in a nursery bed. When planted closely together, he could grow upwards of 350 nursery saplings in a bed, whereas previously

⁸⁵ For a discussion of Cleghorn see Pallavi Das, 'Hugh Cleghorn and forest conservancy in India', *Environment and Hist.* 11 (2005), pp. 55–82.

⁸⁶ For a discussion of its early history see *Report on the administration of the Madras Presidency during the year 1875–6* (1877), p. 307; on its amalgamation see the *Annual administration reports of the forest department, Madras Presidency, for the official year 1883–3* (1884).

⁸⁷ *Report on the government botanical and horticultural gardens Ootacamund for the year 1857* (1859), p. 8.

⁸⁸ *Ibid.*, p. 8.

⁸⁹ *Ibid.*, p. 7.

⁹⁰ *Ibid.*

⁹¹ *Ibid.*

the method of growing them in baskets allowed for only 30 plants to be grown and removed at a time. His technique made it cheaper and easier to supply seedlings for the whole region. This succeeded so well that he ordered 8000 pots, 4000 for the Forestry Department and 4000 for the garden. Both Cleghorn and the revenue council praised McIvor's astute methods for saving money and space.⁹²

The Forestry Department and civil officers, drawing from the Jungle Conservancy Fund (after 1872 the Jungle Conservancy Department), created most of the plantations on Nilgiri plateau in the 1860s and after on lands claimed by the British as either private or government property. In 1869 the Forestry Department transferred its plantations to the Jungle Conservancy Department at the request of the Revenue Board.⁹³ This was part of a wider government effort to tax the use of indigenous forests in order to encourage local residents to conserve timber.⁹⁴ But in 1875 the Jungle Conservancy Department transferred them back to the Forestry Department. The land claimed by government for plantations usually fell under the category of 'wasteland', or lands supposedly unused by the local Toda or Badaga. After a lengthy debate over *bhurty*, the Madras government criminalized this form of shifting cultivation in 1862.⁹⁵ In 1863 the government implemented wasteland rules that strictly defined the settlement boundaries of the Badaga and Toda and opened up new land for purchase at auction.⁹⁶ Ninety-eight per cent of the land sales went to Europeans who actively sought the land for recreation and profit.⁹⁷ After the passing of the 1882 Madras Forestry Act the Forestry Department demarcated and protected certain areas of the indigenous forests as 'reserved', strictly defining them as state property and regulating the 'privileges' (rather than 'rights') of native users. By 1886 over a third of the land in the Nilgiri was reserved.⁹⁸

The Governor of Madras, Sir William Denison, ordered the creation of the first government plantation of *Eucalyptus globulus* in 1862.⁹⁹ But the majority of plantings occurred after 1866–67 following a government decision to promote the creation of large government plantations. This reflected the rapid rise in demand for timber for railway fuel. The Revenue Department decided to establish Australian timber plantations to supply firewood for local usage and for the expanding network of railways. The expansion of railways in the 1850s and 1860s created a fear among officials that there would be a shortage of timber for fuel, both for villagers, cities, and the railway. The Revenue Department had a Presidency-wide debate in 1866–67 about whether or not private plantations could possibly produce enough timber to satiate the growing demand.¹⁰⁰ The reports submitted by civil officials painted a dour picture of the private plantation industry. They criticized Indians for not wanting to make plantations and suggested that the state would need to step in where private industry would not. The collector at Coimbatore argued that they should create a new Nilambur of Australian trees in the Nilgiri: 'A plantation of Australian trees on the same scale on the Neilgherries [*sic*] would, I believe,

⁹² Ibid., p. 15.

⁹³ *Report of the conservator of forests for the official year 1868–1869* (1869), p. 18.

⁹⁴ Sutton, *Other Landscapes*, pp. 123–4.

⁹⁵ Ibid., p. 101.

⁹⁶ Ibid.

⁹⁷ Ibid., p. 102.

⁹⁸ Ibid., p. 105.

⁹⁹ David E. Hutchins, *Report on measurements of the growth of Australian trees on the Nilgiri* (1883), p. 1.

¹⁰⁰ See IOR, L/E/3/771, the larger correspondence and discussion in Madras Revenue Forests Collections to Despatches 1867–69.

eventually prove very remunerative to Government'.¹⁰¹ The Revenue Board responded positively to the suggestion:

The favourable conditions for extending planting on the Neilgherries, and the demand that exist and is likely to increase there for timber and fuel, induced the Board to support the Collector's recommendation that the Forest Department be directed to undertake planting operations there on a large scale.¹⁰²

The Revenue Board instituted a policy of forming new plantations of Australian trees in the 1860s and 1870s. These included the plantations of Arambi (58 acres of *Eucalyptus* created in 1863–5 by the Jungle Conservancy Department), Marlimund (nine acres of *Acacia* and *Eucalyptus* created in 1860 by the collector), Norwood (26 acres of *Acacia* and *Eucalyptus* created in 1872–3 by the Jungle Conservancy Department), Bathri (an unknown acreage of shola was planted in the 1870s by the Jungle Conservancy Department), Ralia (*Acacia* and *Eucalyptus* plantations created in 1872 by the Forestry Department), Old Forest (200 acres of various species planted in 1872–3 by the Jungle Conservancy Department), and Newman (35 acres of *Acacia* and *Eucalyptus* plantations created in 1876 by the Forestry Department).¹⁰³ The government had created 1322 acres of Australian plantations by 1882.¹⁰⁴

The practice of making plantations varied. As noted above, the Ootacamund botanical garden provided the seedlings and saplings for most of the plantations in the region. A review of plantations in 1882 by David Ernest Hutchins, an Indian forest service officer on special duty, discussed the various ways in which the plantations had been formed.¹⁰⁵ The spacing and thinning regimes differed greatly from plantation to plantation, with some plantations of *Eucalyptus* being grown at six feet apart and others at nine feet apart. Some of the plantations were managed as coppice. This method involved foresters cutting a tree at its stump to encourage the growth of multiple smaller shoots, which could be harvested for firewood and other minor timber uses in a shorter rotation. Other forests had been planted and managed as 'high forests', mature forests of a single species that would be replanted after being cut.

The rapid growth of the Australian trees in the Nilgiri plantations became internationally renowned among foresters in the 1880s. The Nilgiri plantations offered some of the world's only examples of blue gum (*Eucalyptus globulus*) outside its native home in Victoria and Tasmania. E. J. Brace reviewed the history of *Eucalyptus* plantations around the world for the international exhibition on forestry at Edinburgh in 1884 and discussed the Nilgiri plantations:

Viewing the Eucalypti from the forester's stand point, it is to be noted that, save on the Nilgiri Hills, afforestation has only been carried out to any extent in the plantations belonging to the French Government in Algeria.¹⁰⁶

Like the Nilambur teak plantation, the fame of the Australian plantations in the Nilgiri arose

¹⁰¹ IOR, L/E/3/771, Collector at Coimbatore to the Acting Secretary, 21 July 1866, no. 188.

¹⁰² Ibid.

¹⁰³ Hutchins, *Report on measurements*, pp. 4–10.

¹⁰⁴ Francis, *Nilgiri*, p. 216.

¹⁰⁵ Ibid.

¹⁰⁶ E. J. C. Brace, 'The formation and management of Eucalyptus plantations', in John Rattray and Hugh Mill (eds), *Forestry and forestry products: prize essays of the Edinburgh international forestry exhibition, 1884* (1884), p. 271.

primarily from the failure of other plantation attempts in India. Outside the cooler confines of Ootacamund, many Britons in India hoped that eucalypts would thrive in the hot climates and cure malaria and other deadly tropical diseases. But *Acacia* and *Eucalyptus* never became as economically valuable or ecologically viable as teak, during British rule. When eucalypts did grow in the hot regions of India (which was not often), they grew stunted and they did not stop deadly tropical diseases. Although many people still believed in the malaria-fighting qualities of eucalypts as late as the 1890s, professional foresters and botanists in India had been refuting the belief that eucalyptus oil helped cure malaria since the 1870s.¹⁰⁷

Australian trees reshaped the ecology, social structure, and aesthetics of the landscape on the Nilgiri plateau. The landscape changed drastically. Blackwood, *Acacia melanoxylon*, used for its excellent timber, established itself quickly – perhaps too quickly – as one forester complained about their aggressive colonization in a report: ‘If Ootacamund was deserted, the whole basin would probably at no lengthened period become a forest of these trees to the exclusion of almost all other vegetation.’¹⁰⁸ Australian trees altered the landscape because of their unique shape and leaves. Because of Australia’s peculiarly nutrient-poor and dry conditions, Australian *Acacia* and *Eucalyptus* had evolved a specific adaptation called ‘sclerophyll’, in which leaves are small, tough, waxy, and have less nutrition. The leaves of Australian trees are rarely bright green like deciduous trees, and can be better described as a mix of grey, blue, and green. The colours proved depressing to many, and others criticized the rapid growth of *Acacia* and *Eucalyptus* because the ‘tall Australian trees ... shut out light, air and the view’ of buildings around the city.¹⁰⁹ Towards the end of the nineteenth and early twentieth century many people complained about the destruction of the indigenous forests. The sportsman F. W. F. Fletcher later lamented, ‘The grand indigenous sholas [the name for the native forests on the hills] have been cleared to make way for interminable forests of ugly eucalyptus and wattle.’¹¹⁰

Australian trees helped introduce capitalism, the distinction between state and private property, and a new social system in the region surrounding Ootacamund. Many British officials viewed the creation of plantations as a way of creating a wage labour force and a land revenue system for the indigenous people living on the Nilgiri plateau. Many of these plantations were often on or near ‘wastelands’ claimed near Badaga villages in the eastern half of the Nilgiri plateau.¹¹¹ Madras foresters and revenue officials sought to use revenue settlements and plantations to encourage the Badagas to become sedentary farmers and grazers.¹¹² The Badagas worked as labourers on plantations from the 1860s; sometimes they worked without payment because *monigars*, villagers chosen by the British to collect revenue and to find labour, forced them to work for free.¹¹³ With a third of the forests on the Nilgiri

¹⁰⁷ Gamble, *Manual of Indian timbers* (1881 edn), p. 189.

¹⁰⁸ *Report of the conservator of forests for the official year 1868–69* (1870), p. 19.

¹⁰⁹ Francis, *Nilgiri*, pp. 215–6.

¹¹⁰ F. W. F. Fletcher, *Sport in the Nilgiri and in Wynaad* (1911), p. 18.

¹¹¹ *Annual administration report of the forest*

department 1898 (1899), p. 33. Anthropologists tended to view the growth of eucalypts around the regions where hill tribes lived with approbation. J. Shortt, ‘An account of the tribes on the Neilgherries’, *Trans. Ethnological Soc. of London* 7 (1869), p. 234.

¹¹² Sutton, *Other landscapes*, pp. 134–5.

¹¹³ *Ibid.*, pp. 94–6.

plateau reserved, an expanding plantation frontier, and new laws in 1863 that required all unclaimed lands be auctioned, it became more difficult for the demographically expanding Badagas to acquire new lands.¹¹⁴ They lost much of the land that they had formerly claimed and were hemmed in by plantations and state forest reservations.

Neither these scientific successes nor the ecological and social effects of Australian timber plantations can be attributed to the influence of German or French forestry methods. The report by Hutchins in 1882 – a full 30 years after the founding of the first government plantation – laid down for the first time a systematic working plan for the management of the plantations that estimated of the rates of growth, advocated a spacing and thinning regime, and calculated the future yield of the plantations. Hutchins maintained that the plantations should be managed as ‘high forests’, not as coppice on shorter rotations, as some, such as the previous conservator, Captain Beddome, had argued.¹¹⁵ This required more thinning than had been previously done. Yet his theoretical analysis, based upon an individual-increment and acre-increment (i.e. figuring out the average yield per tree and acre), merely offered a guide for how to manage the plantations for the highest yield, and did not take into account the costs of labour or the exigencies of the market.

During the 1890s, the botanical garden and Indian forest service decided to stop making plantations of Australian trees and chose instead to replant the landscape with native trees. The Forestry Department ceased large scale planting of Australian trees in 1897.¹¹⁶ The government gardens in Ootacamund and Coonoor began to grow more indigenous trees from the sholas in their nurseries for display at the garden, in the towns, and for planting in overcut sholas. Whereas the 1857 Botanical garden report noted that Australian trees were ‘used in plantations for shelter and ornament, in preference to indigenous trees’¹¹⁷ the botanical garden report for 1892–3 noted,

As in the Government Gardens in Ootacamund, so here in Sim’s Park [a botanical garden constructed in 1874 in Coonoor], the indigenous trees of the hills of Southern India are being grown in the place of the more common exotics.¹¹⁸

Complaints about the aesthetics of *Eucalyptus* forests by officials living at the government house in Ootacamund led to their replacement with indigenous trees in 1894:

The whole of the blue gum forest, which has become very ugly and in some places dangerous ... will be cut down, and the whole area planted up next year with indigenous shola trees.¹¹⁹

Foresters eventually rejected Hutchins’s suggestion to manage the plantations as high-forest and chose instead to manage the plantations under a coppice system based upon a ten-year cycle.¹²⁰ By the 1890s and early 1900s it became apparent that the projected value of Australian

¹¹⁴ Ibid., pp. 101–5.

¹¹⁵ Hutchins, *Report on measurements*, p. 24.

¹¹⁶ *Annual administration report of the forest department, Madras Presidency, for the twelve months ending 20 June 1897* (1898), p. 33.

¹¹⁷ *Report on the government botanical and horticultural gardens Ootacamund for the year 1857*, p. 16.

¹¹⁸ *Annual administration report of the government botanical gardens and parks, Nilgiri, for the year 1892–93* (1893), p. 2.

¹¹⁹ *Annual administration report of the government botanical gardens and parks, Nilgiri, for the year 1893–94* (1894), p. 1.

¹²⁰ Francis, *Nilgiri*, pp. 215–6.

trees was overly generous. The timber of *Eucalyptus globulus*, imagined in the 1840s and 1850s to be as good as teak, proved much less durable and useful than imagined. The prediction of a forest famine never manifested itself for a variety of reasons. Railways in southern India used less wood than predicted, both for railway sleepers and fuel. From the 1860s onwards, the Madras Railway began to use iron instead of native timber sleepers.¹²¹ Steam engines used more imported and domestic coal than originally expected.¹²² The strict conservancy of reserved forests slowed and perhaps stopped the pace of deforestation in government forests in the late nineteenth and early twentieth centuries. Eventually the Forest Department had to quit working some plantations, such as the *Dharma* plantation of *E. globulus*, because of a 'lack of demand'.¹²³

Plantations of Australian trees ultimately succeeded on the Nilgiri not because of any attempt to implement European forestry theory or practice. Like the teak growing at Nilambur, the climatic and environmental conditions of the Nilgiri plateau, especially the area surrounding Ootacamund, allowed for the rapid growth of cool weather Australian species of *Acacia* and *Eucalyptus*. Yet the success of Australian trees cannot be ascribed merely to environmental or geographic determinism, although these created conditions that allowed the trees to thrive. Human manipulation, especially through McIvor's methods of growing and transplanting, helped to officials to establish large government plantations in the region. Without the creation of a government town and growing agricultural plantations, it is unlikely that the need for firewood would have been as pressing. The success of Australian trees in the region resulted from the constant planting and support of a variety of people including missionaries, private landowners, foresters, district officers, revenue collectors, planters, and Badaga labourers. Indeed, the timing of planting and the supporters of Australian trees had strong connections with the expansion of coffee, tea, and cinchona plantations at the same period. The methods and planting regime of these trees overlapped. It is this larger agricultural plantation economy and ecology in which historians should situate the rise of Australian timber plantations.

III

Widespread failures and partial successes occurred when Indian Forest Service officers tried to replicate the success of plantations at Ootacamund and Nilambur. Notably, the two most successful plantations were established prior to the formation of state forestry and the introduction of European forestry methods into India. They had strong linkages with the rise of a plantation agricultural and botanical garden complex in southern India. The failure to replicate the success of these two sites led forestry officials at the beginning of the twentieth century to turn away from plantations and to focus on regenerating existing indigenous forests. It was only in the middle of the twentieth century that timber

¹²¹ See the discussion by Bryce McMaster, 'On the woods used for sleepers on the Madras railway', *Minutes of Proceedings of the Institution of Civil Engineers* 22 (1863), pp. 241–54.

¹²² For some of the costs of coal versus wood and the

various rates of usage by railway companies see *Trans. North of England Institute of Mining and Mechanical Engineers* 38 (1891), pp. 159–61.

¹²³ Francis, *Nilgiri*, p. 215.

plantations proliferated across India, a result of continued experimentation with key genera, such as *Eucalyptus*.¹²⁴

Successful plantation programmes during the late nineteenth century – in southern India, South Australia and the Cape Colony – resulted not from the introduction of European forestry methods, but rather from an experimental tradition that linked together botanical gardens with experiments in the field. Many of the key innovators in plantation techniques were not trained foresters, but came from a variety of backgrounds. The difficulties foresters faced when trying to replicate successful plantations show the ecological and economic limits of state forestry in India. Foresters could not easily replicate either European methods, or even local successes, elsewhere in India or throughout the British Empire. Historians focusing on forestry need to incorporate the general failure of plantations into their larger analysis, instead of implying that the successes of Nilambur and Ootacamund were characteristic of the fortunes of timber plantations as a whole.

¹²⁴ Brett Bennett, 'The El Dorado of Forestry: Eucalyptus in India, South Africa and Thailand, 1850–2000', *International Rev. of Social Hist.* 55 (2010), pp. 40–5.