Foresters and the politics of colonial agroecology: The case of shifting cultivation and soil erosion, 1920–1950

S. Ravi Rajan

University of California
Santa Cruz

A great deal of recent research on colonial environmental history has had a regional focus deriving from painstaking work on governmental archives. Many of the resultant historical narratives have therefore been on state policies, often on very local contexts. Without disputing any of this work, this article, as is the wider project of which it is a part, attempts to examine colonial 'environmental' debates from a different set of sources and perspectives.[1] Instead of examining governmental policy in a region, it looks at a specific component of the state—the community of scientists involved in formulating policy, and their intellectual debates on conservation. This article focusses specifically on British colonial foresters and their deliberations at the Empire Forestry Conferences on two crucial colonial agro-ecological policy concerns—shifting cultivation and soil erosion—during 1920 to 1950.[2] It concentrates in particular on how their perspective and training as *foresters* enabled them to agree on pan-colonial policy guidelines to approach these issues.

Empire Foresters and the Debate on Shifting Cultivation

The debate on shifting cultivation at the Empire Forestry Conferences began with a strong articulation of the kinds of perspectives alluded to by most environmental historians when they refer to colonial approaches to the issue.[3]

[1] The wider project alluded to is my forthcoming book, *Modernizing Nature: British Colonial Foresters, Ecodevelopment Agendas and Postcolonial Legacies, 1850–1990*.

[2] The Empire Forestry Conferences were held six times during this period—in London, 1920; Canada, 1927; Australia and New Zealand, 1928; South Africa, 1935; London, 1947, and; Canada, 1952. For more on the Empire Forestry Conferences see chapters 4 and 5 of Rajan, *Modernizing Nature*.

[3] J. Pouchepadass, 'British Attitudes to Shifting Cultivation in Colonial South India: A Case Study of South Canara District, 1800–1920' (unpublished paper, 1992); M. Rangarajan, 'Swidden

Studies in History, 14, 2, n.s. (1998)
SAGE PUBLICATIONS New Delhi/Thousand Oaks/London

This perspective was set forth by J.R. Ainslie, a forest officer from Nigeria, and R.M. White, a forest officer from Ceylon. Ainslie began by comparing shifting cultivation with what he referred to as 'real agriculture'. Whereas the latter was the 'cultivation of the soil on a rotation of crops', the former was the 'cultivation of crops on a rotation of soils'. Shifting cultivation was thus the very reverse of 'normal' agriculture. It was

> the setting fire to a piece of forest during dry weather, the cultivation for a year or two of the ground thus cleared, and, when the crops begin to fail owing to soil deterioration, the moving on to another piece of virgin forest land, there to recommence the process.[4]

It was, he argued, a process that caused immense destruction. The forests of Nigeria alone had halved over the past eight decades and approximately 2,000 square miles were lost in Nigeria each year. 'One has only to pass through the numerously repeated areas of high forests destroyed and blackened by this fire-cultivation', he said, 'to see in a practical and vivid form the almost incredible extent of the damage done'.[5] On the one hand, this meant severe ecological disruption: shifting cultivation caused soil erosion and deterioration. On the other, it had major economic consequences. In local terms, it meant the creation of timber and fuel famines. In national terms, it meant 'an annual drain on resources' and in West Africa as a region, in the successive replacement of a 'superior' forest type by 'considerably inferior and more xerophytic types'.[6] Shifting cultivation, Ainslie argued, also caused a great deal of 'political damage': the 'prevention of permanent settlements or dwellings', and the

> prevention of permanent improvements of all things, and in the consequent retarding of civilisation, the encouragement of nomadic instincts and vagrant, indolent, and thriftless habits among the people, whether they were inclined that way or not.[7]

Shifting cultivation was thus 'as vitally important to West Africa as fire control was to Canada'. It was, in fact, of 'imperial importance': West Africa had 14

Cultivation and Forest Management in the Central Provinces: Baigas, Gonds and the British' (unpublished paper) 1992; M. Gadgil and R. Guha, 'The Problem of Shifting Cultivation', in *idem, This Fissured Land: An Ecological History of India*, Delhi, 1992, pp. 150–57; and Raymond L. Bryant, 'The Rise and Fall of *Taungya* Forestry', *The Ecologist*, Vol. 24: 1, January/February 1994, pp. 21–26; *idem*, 'Shifting the Cultivator: The Politics of Teak Regeneration in Colonial Burma', *Modern Asian Studies*, 28:2, 1994; and *idem*, 'Contesting the Resource: The Politics of Forest Management in Colonial Burma', Ph.D. dissertation, University of London, 1993.

[4] J.R. Ainslie, *Proceedings of the Empire Forestry Conference* (hereafter *PEFC*), II, p. 325.

[5] *Ibid.*, p. 326.

[6] *Ibid.*, p. 325.

[7] *Ibid.*, p. 326.

per cent of Empire forests which contained a great palm-oil wealth, kept her rivers navigable and protected her agricultural products to such an extent that without it Nigeria alone would lose half her export trade.[8] It was, however, a practice that was very difficult to eliminate. The 'peculiar system of land tenure prevailing in West Africa' meant that wastelands and forests were not state owned but communally owned. Reservation was thus a lengthy process. At the outset, an agreement had to be reached with the chiefs and council of each commune or tribe. This took several years. Next, a preliminary proclamation had to be made. This took almost a year and, since there was no legal protection in this phase, actually served as an advertisement to forest destroyers that 'here is a place of convenient and compact virgin land awaiting shifting cultivation'. This phase was succeeded by a prolonged period of settlement and demarcation which took almost a decade. It is only after this that a final proclamation could be made. Even this legal protection did not often prove entirely effective.[9]

R.M. White agreed with Ainslie on the issue of the dangers of shifting cultivation. It meant, he argued, not only the loss of invaluable timber, but the loss of

> an agent indispensable for building up and maintaining natural soil fertility which in Ceylon is the ultimate source of almost all production and wealth.[10]

Moreover, shifting cultivation was regarded as destructive even by traditional enlightened Sinhalese opinion. It was continual war that forced this practice and the result was that Ceylon, from once being an exporter of food, had now become an importer.[11]

Ainslie and White concluded that shifting cultivation could, in principle, be allowed to proceed in areas where adequate control could be exercised provided a long enough rotation be insisted upon to prevent undue soil and forest deterioration. They urged that steps be taken to expedite control by increasing facilities for forest survey, settlement and demarcation.[12] They argued, however, that there was often, as in Ceylon, not enough land available to ensure sufficiently long rotations and that this meant increased shifting cultivation in low jungle on short rotations, thereby increasing the acreage of once fertile land annually converted into abandoned scrub.[13] More importantly, Ainslie and White contended that although expedient, systems of forest management involving shifting cultivation were sylviculturally unsound.[14] They

[8] *Ibid.*, p. 328.
[9] *Ibid.*, p. 326.
[10] R.M. White, *PEFC*, II, p. 328.
[11] *Ibid.*, p. 328.
[12] *Ibid.*, p. 327.
[13] *Ibid.*, p. 328.
[14] *Ibid.*, p. 328.

therefore argued for a total ban on shifting cultivation, especially in high forests, particularly because existing land tenure rules and other reasons did not enable the extension of forest reservation.

While sharing the concerns of Ainslie and White, other officers adopted a different perspective on the issue. One such officer was Edward Battiscombe, a forester from Kenya. The forest ordinance in Kenya in 1911, he stated, gave the Governor the right to declare any area of Crown land a forest area and have it demarcated. Once this was done, the district forest officers and the political officer could order the natives not to do certain things. After the passing of the forest ordinance, every native was registered and all cultivated land marked. Moreover, state control was established to such an extent that the

> natives plant exactly where we tell them to cultivate. When wood is required for example to make a railway, we divide the land and give it to the natives. They plant their crops in the first year. In the second, we plant and they put in their crops with the trees. According to their arrangements, which are endorsed by the magistrate, they have to look after the trees; if they fail to do so they are fined. In the third year they again plant crops and in the fourth they can also plant if the trees are not too large by that time.[15]

Battiscombe stated that such a system of forest management was indeed shifting cultivation but argued that it was indispensable because it provided a supply of reserve labour and resulted in an increase in foodstuff production. In Kenya, thus, illegal shifting cultivation had been abolished but 'legal shifting cultivation was the mainstay of forest management at the moment'.[16]

The discussion that followed was led by Professor R.S. Troup, a former Indian forest officer and then chair of the Oxford Forestry Institute. Troup began by agreeing with the views expressed by Ainslie and White. Shifting cultivation, he said, was very destructive. It left land derelict and severely eroded soils. He argued, however, that it could serve a useful sylvicultural purpose in certain conditions. In Burma, for instance, plantations were raised with the aid of shifting cultivation at very little cost. In Bengal, the natural regeneration of *sal*, the most important timber tree of that country, had failed. Nothing, except to cut and regenerate artificially, seemed possible, and this would have been out of question if it were not for the cheap labour provided by coopting shifting cultivation. Thus,

> men who had been turned out of the reserves years before as being the destroyers of the forest were induced to come back. The regeneration there is now almost entirely carried out with the aid of shifting cultivation.[17]

[15] E. Battiscombe, *PEFC*, II, pp. 329–30.
[16] *Ibid.*, p. 330.
[17] R.S. Troup, *PEFC*, II, p. 333.

Again, in East Africa, he argued, the abolition of controlled shifting cultivation would mean the doing away of the most effective means of regenerating forest.[18]

Troup argued that there were two basic issues that needed to be appreciated. The circumstances under which the practice of shifting cultivation took place needed to be checked 'at all costs', if any forests in the countries concerned were to be left. However, it ought to be understood that controlled shifting cultivation was

> undoubtedly the surest and in many respects the cheapest method of carrying out plantation work in the tropics and in dry climates. In the Deccan of India and in many parts of the Bombay Presidency and Berar—in fact, in all climates with a low rainfall—it is now recognised as the best method of forming plantations.[19]

A similar view was expressed by Owen Jones, a Forestry Commissioner from Victoria, Australia. Uncontrolled shifting cultivation, he said, was absolutely bad but 'more or less controlled shifting cultivation' combined with planting would yield the desired results. Controlled shifting cultivation, along with an increase in the forest staff so that 'where you have this controlled shifting cultivation you may really be able to control it', could thus be the framework of a pan-colonial policy.[20]

The idea of controlled shifting cultivation as an Empire-wide policy was, however, not accepted by Ainslie. In Africa alone, he argued, a perspective such as the above may be applicable in Kenya but not in West Africa. He advanced two reasons, one political and the other scientific, in support of his argument. The political reason was that the native of West Africa was, unlike his East African counterpart, a 'member of a civilised community'. It was therefore not possible to 'suddenly enforce upon him distasteful legislation and thereby control his activities'.[21] The scientific reason was that the cutting down of a rain forest, whether by clear felling and burning or by *chena* cultivation, meant that the resultant forest would be of a more xerophytic type. The original evergreen forests could not be regrown without first working, manuring and, generally, intensively cultivating, the forest. The same was true, he said, for deciduous forests in the region. Ecological progression in this region, he said, normally meant that influenced by geological and planetary causes, mangrove swamps would slowly move to the sea, the rain forest to the belt previously occupied by the mangroves, the deciduous to the rain forest belts, the savannah to the deciduous and the desert to the savannah. Shifting

[18] *Ibid.*, p. 333.
[19] *Ibid.*, p. 333.
[20] Owen Jones, *PEFC*, II, p. 335.
[21] Ainslie, *PEFC*, II, p. 333.

cultivation, practised on the scale that it was in this region, however, enormously accelerated this normal ecological progression of plants. 'I have myself seen', he said, 'rain forest clearings reverting not to deciduous forest, which is the next progressive xerophytic grade, but straight to savannah'.[22]

The discussion on shifting cultivation was thus split between advocates of controlled shifting cultivation as an intrinsic aspect of sylvicultural policy, such as Battiscombe and Owen Jones, and those like Ainslie and White, who did not accept the idea that shifting cultivation could be part of a sound sylvicultural practice. In order to resolve this, the conference, on the suggestion of Major Ralph Furse, the Recruiting Officer of the Colonial Office and a leading proponent of forestry, decided to set up a committee of 'neutrals'—Furse himself, Troup, Jones and W.A. Robertson, Deputy Conservator of Forests, Burma, to examine this question.

The committee began its report by defining shifting cultivation as 'a system of temporary cultivation under which areas of forest are felled and burned. The clearings are temporarily cultivated with agricultural crops for one year, or a few years, and then abandoned'.[23] The committee identified two types of shifting cultivation, the recurrent and the nomadic. In the former, 'a sequence of felling is adopted, the same areas being cleared and cultivated again after a period of rest, during which the forest is allowed to recover to a certain extent'.[24] In the latter, 'no regular sequence of felling is adopted, the same areas being permanently abandoned'.[25]

The committee agreed with Ainslie and White that shifting cultivation caused both forest destruction and political damage. Shifting cultivation, it said, resulted in the destruction of forest wealth as represented by timber, induced a regrowth of less valuable species and vegetation of a more arid type. In the recurrent type, it argued, population pressure tended to reduce the rest period, and if carried too far, resulted in the complete sterility and often denudation of the soil, whether for forestry or for agriculture. If frequent fires and promiscuous felling and grazing took place in the abandoned areas, the committee argued, the ecological impact would be compounded. Similar problems would occur in the case of the nomadic type. The political damage caused by shifting cultivation was its inducing nomadic habits on part of the local population, discouraging agricultural progress and facilitating the evasion of taxation.[26]

The committee was, however, pragmatic in its recommendations. In laying down a pan-colonial policy guideline, it struck a compromise between the perspectives of White and Ainslie on the one hand, and Battiscombe and Owen

[22] *Ibid.*, p. 334.
[23] 'Report of the Committee on Shifting Cultivation', *PEFC*, II, p. 407.
[24] *Ibid.*, p. 407.
[25] *Ibid.*, p. 408.
[26] 'Report of the Committee on Shifting Cultivation', pp. 407–8.

Jones on the other. In doing so, it differentiated between geographical contexts in the Empire and was particularly cognizant of strategic economic and political issues.

Addressing the case of West Africa first, it began by stating that the destruction of North American forests and the proximity of West African forests to European and American markets meant that they were not only a potential source for the hardwood demands of Europe, but, in times of war, were the nearest large forests to the UK under British control. It identified shifting cultivation as the major cause of forest destruction in the area, affecting not only timber production but agriculture due to the sterilisation of soil, and palm oil production, which demanded moist soil conditions. It went on to recommend that shifting cultivation be replaced by systems of permanent agriculture. It further recommended that the procedure to constitute forest reserves be accelerated; that the extension of existing rights or the accrual of new rights to shifting cultivation be prohibited in areas proposed for reservation, and; that forest officers be given power to deal summarily with the infringements of regulations concerned with the control of shifting cultivation.[27]

It, however, urged that where possible, full use be made of shifting cultivation as an aid to the propagation of valuable species over suitable areas after exploitation. To this end, it recommended the formation of forest villages for the local supply of forest labour. The committee made a similar recommendation for Ceylon, for which it recommended that shifting cultivation be used to assemble marketable timber stands in forest reserves and it be gradually eliminated and replaced by permanent wet- and dry-soil cultivation in other areas.[28]

For East Africa, the committee ratified the existing policy of extending *controlled* shifting cultivation in reserved forests stating that it would materially assist in increasing the forest wealth of the colony by affording a cheap and efficient means of propagating the more valuable species of trees and by increasing the supply of local forest labour.[29] Finally, for India, it stated that existing legislation was adequate and recommended that protection against shifting cultivation could therefore be extended by reserving the land which ought to be maintained under forests. It also urged the formation of forest villages inside reserves as part of the sylvicultural operations involved with controlled shifting cultivation.[30]

The resolution adopted by the conference unanimously approved the recommendations made by the committee. It stated that the practice of shifting cultivation was a serious menace except when controlled as an integral part of forest management. It stated, however, that if controlled from a forestry point of view, shifting cultivation could be a useful and necessary tool in sylvicultural

[27] *Ibid.*, pp. 408–10.
[28] *Ibid.*, p. 410.
[29] *Ibid.*
[30] *Ibid.*, pp. 410–11.

operations. It went on to urge governments to 'take such measures as may be necessary to deal with the situation' in cognizance of the particular demands of each geographical and ecological area and political context in the empire'.[31]

The fundamental point that emerges from this debate on a pan-colonial policy on shifting cultivation, and especially from the manner of its resolution, is that the foresters approached the issue essentially from the standpoint of the sylvicultural principles of continental forestry. This, as argued elsewhere, basically meant two things: the economic philosophy—the balance sheet and sustained yield—that guided sylvicultural practice, and the related ecological concern about the material physical effects of forests—their 'indirect' biological benefits, which in turn were connected to the former.[32] Shifting cultivation was bad because it potentially affected the revenue that the state could accrue from forests—from the sale of hard wood and other forest products. If controlled, however, it could be useful in some cases, especially in contexts where the cost of employing labour for artificial plantations could be avoided by a contractual agreement with shifting cultivators whereby they would provide labour for plantations free in exchange for being allowed to cultivate in forest lands—chosen by foresters. The basis of such an agreement stemmed from sylvicultural considerations that reflected the predominant ideological orientation of continental forestry which, needless to say, resonated with the priorities of the colonial state. It is this shared ideological orientation stemming from their training (all colonial foresters in the period in question were trained in one forestry school—at Oxford) that allowed foresters like Battiscombe on the one hand, and White on the other, coming as they did from different regional experiences, to agree on a pan-colonial policy guideline. It is also this orientation that informed their approach to the second of the issues being discussed in this article, i.e., soil erosion.

Foresters and the Politics of Soil Erosion

In the mid 1930s, colonial officials—bureaucrats, agriculturists, irrigation engineers and foresters in Africa and much of the tropical empire had begun to cry hoarse about an environmental crisis that had then begun to threaten not just the physical environment but ultimately the colonial economy. The problem was erosion and, in particular, the destruction of soils.

As with the case of shifting cultivation, there is a substantial body of historical literature on this phenomenon, focussing largely on east, central and

[31] Resolution 10, 'Shifting Cultivation', 'Report of the Committee on Shifting Cultivation', *PEFC*, II, pp. 386–87.

[32] For a discussion of continental forestry see S. Ravi Rajan, 'Imperial Environmentalism or Environmental Imperialism: European Forestry, Colonial Foresters and the Agendas of Forest Management in British India, 1850–1900', in Richard Grove, ed., *Nature and the Orient*, Delhi, 1997.

southern Africa.[33] This literature begins by noticing the extent to which the problem of soil erosion had across these regions become an important issue in colonial environmental politics by the mid 1930s. In Zimbabwe, for example, declining crop yields had prompted farmers to raise the issue of 'soil wastage' at the 1931 congress of the Rhodesia Agricultural Union. This had eventually resulted in the formation of the Soil Conservation Advisory Councils in 1934, which served as the first formal framework for communication between farmers and various governmental officials.[34] Throughout east and central Africa and in the Colonial Office, the problem of soil erosion had become an important issue of governmental concern throughout the 1930s.[35]

In its analysis of the colonial approaches to soil erosion, the recent work in environmental history has argued that the origins of the official concern about soil conservation lay in four factors. First, there were anxieties about security and land ownership among the white settler-communities in the wake of the depression.[36] Second, there was a wider international scientific concern with soil conservation following the dust bowl in the United States during the period.[37] Third, there was a great deal of worry about demographic increases (of both human and animal populations) and the consequence of this on the carrying capacity of land.[38] Finally, there were fears about desiccation, aridity and impending drought.[39]

The response of colonial states to soil erosion, according to this analysis, was shaped by an approach that emphasised scientific research on various aspects of soil conservation. These studies, in turn, were oriented towards demonstrating the need for better husbandry under strictly controlled conditions of land management. Across east and central Africa and other parts of the Empire, therefore, such studies 'demonstrated' the need for enforcing specific technical methods of land management and, in some areas, forcibly de-stocking overgrazed pastures.[40]

[33] Among the most important historical studies that appeared in the 1980s on soil conservation were David Anderson, 'Depression, Dust Bowl, Demography and Drought: The Colonial State and Soil Conservation in East Africa During the 1930s', *African Affairs*, Vol. 83: 332, pp. 321–43; W. Beinart, 'Soil Erosion, Conservationism and Ideas About Development: A Southern African Exploration, 1900–1960', *Journal of Southern African Studies* (hereafter *JSAS*), Vol. 11: 1, 1984; R. Whitlow, 'Soil Conservation History in Zimbabwe', *Journal of Soil and Water Conservation*, Vol. 43: 4, 1988; J.E.G. Sutton, 'Irrigation and Soil Conservation in African Agricultural History', *Journal of African History*, Vol. 25, 1984; and K.B. Showers and G.M. Malahleha, 'Oral Evidence in Historical Environmental Impact Assessment—Soil Conservation in Lesotho in the 1930s and 1940s', *JSAH*, Vol. 18: 2, 1992.

[34] Whitelow, 'Soil Conservation History in Zimbabwe', pp. 299–300.

[35] Anderson, 'Depression', pp. 322–43.

[36] *Ibid.*, pp. 323–24.

[37] Anderson, 'Depression', p. 326; Beinart, 'Soil Erosion', pp. 68–69.

[38] Anderson, 'Depression', p. 331; Beinart, 'Soil Erosion', pp. 70–75.

[39] Anderson, 'Depression', pp. 331–33; Showers and Malahleha, 'Oral Evidence', p. 282; Beinart, 'Soil Erosion', p. 58.

[40] Anderson, 'Depression', pp. 334–38; Showers and Malahleha, 'Oral Evidence', p. 285.

The issue of soil erosion, it has thus been argued, was seen by the colonial state largely as a technical problem with technological and engineering solutions.[41] A result of this was that the entire debate on soil conservation was couched in terms that emphasised the role of the scientific expert. Given the social roots of the technological experts, it has thus been asserted, the nature of their technical interventions was by no means value-neutral. On the contrary, they reflected the agricultural priorities of settler populations and the biases of settlers against indigenous peoples. An important aspect of the conservationist ideology perpetrated at this time, therefore, was a concern to effect what might be termed as technocratic closure, to restrict and control access of local populations to natural resources under the guise of ecological improvement. The welfare of the soil thus emerged as the 'cutting edge of justification for intervention in peasant agriculture'.[42]

Much of this analysis has been corroborated by the discussions at the Empire Forestry Conferences which were a major stocktaking forum and a centre of calculation for the colonial scientific forestry expert.[43] The discussions on agroforestry issues and erosion at the Empire Forestry Conferences began by painting a picture of impending ecological doom. They were premised on a unanimous agreement that there was 'no doubt about the effect of deforestation on erosion'.[44]

Speaker after speaker from different parts of the Empire thus illustrated the seriousness of erosion in his region of the world. In India, the river beds in the Himalayan foothills and elsewhere had dried up because of deforestation.[45] In Ceylon, there was 'not a river' which had clear water during the rains. Rivers and streams were mostly 'highways for conveying thousands of tons of the finest soil to the sea'.[46] In parts of Australia, the destruction of forest cover had caused serious erosion on the hilly areas and water levels had been greatly lowered.[47] In New Zealand, steep hillsides were altercations of bare landslides and strips of scrub and bracken. Large areas of shingle moved slowly on to the flats and gradually raised the river-beds resulting in serious deterioration of the lands, and frequently in the aggrading of river-beds followed by the wandering of the stream course. Moreover, the loss of the plant coverings on these slopes increased floods in rivers.[48] In Canada, there were many instances where the effect of deforestation, particularly on runoffs, were pronounced.[49]

[41] Showers and Malahleha, 'Oral Evidence', p. 285; Beinart, 'Soil Erosion', p. 60.

[42] Beinart, 'Soil Erosion', p. 83.

[43] The term 'centre of calculation' is used here in the sense it is used in Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society*, Cambridge, Mass., 1987.

[44] W.R. Jacob, *PEFC*, III, p. 186.

[45] E.O. Shebbeare, *PEFC*, III, p. 189.

[46] A.B. Lushington, *PEFC*, III, p. 191.

[47] E. Julius, *PEFC*, III, p. 192.

[48] Phillip Turner, *PEFC*, III, p. 189.

[49] E.H. Finlayson, *PEFC*, III, p. 186.

In Kenya and east Africa, entire hill sides had been denuded, and very little soil was left. Rivers that were once perennial were now only seasonal.[50] In southern Africa, desiccation had been a threat 'for a long time'. Hippo pools, for example, were no longer in existence except in the form of dried up holes in the river-beds. Forests which had once formed the habitat of various wild animals such as the buffalo and lion had disappeared and were replaced by different types of vegetation, accompanied by arid conditions. Moreover, actual decline in rainfall had recently been measured: there was a marked diminution in rainfall over the past four to five decades.[51] Again, in Nigeria, particularly in the regions with an average rainfall around ten to twelve inches per annum, there was terrible erosion. Strong winds in the winter months drove along, picked up soils from deforested areas and deposited them either in dry stream beds to form sand drifts or in the larger rivers from where they washed down to form the Niger delta. In the rainy season that followed the long dry season, the torrential rains carried the soil to the rivers which, after one downpour, resembled liquid mud, with the 'consistency of thin porridge'. This porridge-like water was then carried down the rivers and as the gradient decreased, deposited by the water, thereby spreading over the agricultural land or filling up the river-beds. This in turn exposed a bigger surface area to evaporation and caused further deposition, thus creating a multiplier effect. The result was that most of northern Nigeria, which had once been covered by forests, was now drastically suffering ecological degradation and assuming desert-like conditions.[52]

Having described the extent and seriousness of soil erosion across the Empire, the foresters dwelt on the ecological and economic importance of soils. Soil, according to one forester, was 'man's capital'. Its deterioration led the way to a lower standard of living and, eventually, desertification. Erosion cut at the very roots of the economic structure. Soil and water conservation were thus issues that affected the community at large.[53] In making these points many foresters took recourse to history. 'If one compared the grandeur of ancient kingdoms with their present day decay and their ancient wealth with the amount produced today', argued C.G. Trevor, Inspector-General of Forests for India, 'one could only be driven to one conclusion that the present decay of these countries was largely based on the deterioration of the moisture that lay in the earth'. The palace of the 'King of Kings', Darius in Susa was now in an uninhabited wilderness desert. Mesopotamia, which once produced all the revenues of Persia, had degenerated into a dreary waste. The hanging gardens of Babylon were now a 'rubbish dump', a result of the destruction of the forests of the hills and thus of the 'finest irrigation system in

[50] H.M. Gardner, *PEFC*, III, p. 191.
[51] J.D. Keet, *PEFC*, IV, pp. 114–15.
[52] Ainslie, *PEFC*, IV, p. 118.
[53] A.P.F. Hamilton, *PEFC*, IV, p. 80.

the world'. The lessons of history, claimed Trevor, showed that deforestation, by lowering the moisture content of the soil and thus decreasing the water supplies of the country, had done 'more damage than any war and had resulted in the destruction of the greatest empires'.[54]

In their diagnosis of the causes of soil erosion and depletion, foresters pointed their fingers first at agricultural populations who were seen as encroaching on forests. They argued that with demographic increase and the unavailability of more land for agriculture, there was an increasing pressure on marginal lands, including forests, for agricultural purposes and grazing. In Nyasaland, for example, 'a dense and rapidly increasing population' was increasingly moving towards lands that were of only limited and temporary agricultural value.[55] In the Gold Coast, the growth of population meant a rapid increase in the demand for land, and the consequent destruction of forests: it was claimed that forests over there were receding at the rate of 300 square miles per year.[56] The problem was similar in Nigeria and other parts of tropical Africa.[57]

The increasing conversion of forests and other marginal lands to agriculture was seen by foresters as producing the problem of soil erosion in three important ways. First, the use of forests and other lands not ideally suited for agriculture and the over-cultivation of traditional agricultural lands meant that soils, across the tropical Empire, were beginning to deteriorate seriously. The process of periodic reconditioning of the soils was being critically disturbed.[58] Second, methods of cultivation normally associated with sparse populations in regions of unlimited forests were increasingly being used by large anchored populations in areas of sparse forest. In Nyasaland, for example, finger millet was being grown by the 'soil burning' method although the people had become more or less anchored and had to use two to three year regrowths for burning rather than loppings from large trees. This led to an acceleration in the indiscriminate removal of natural vegetation and consequently in erosion and desiccation.[59] Third, overgrazing caused a great deal of destruction of vegetation and often prevented fresh seedlings from taking root.[60]

In addition to identifying the cause of soil erosion as the 'encroachment' on forests by agricultural populations, foresters argued that it was also a consequence of poorly planned policies of settlement[61] and the unrestricted operations of timber companies whose practices drastically affected stream flow.[62]

[54] C.G. Trevor, *PEFC*, IV, pp. 109–110.
[55] J.B. Clements, *PEFC*, IV, p. 214.
[56] H.W. Moore, *PEFC*, IV, p. 220.
[57] Ainslie, *PEFC*, IV, pp. 217–19.
[58] J.R. Clements, *PEFC*, IV, p. 214.
[59] *Ibid.*, pp. 214–15.
[60] See, e.g., Dr Unwin, *PEFC*, III, p. 189, and Ainslie, *PEFC*, IV, p. 118.
[61] Turner, *PEFC*, IV, p. 189.
[62] Finlayson, *PEFC*, IV, p. 120.

There was a considerable degree of unanimity among colonial foresters from different parts of the empire on how the problem of soil conservation was to be addressed. Three broad and often complementary types of approaches were suggested. The first envisaged technological fixes, such as bore-well digging, to generate irrigation. The second involved adopting various forms of coercive practices to ensure that local peoples cooperated with governmental policies. This included measures for forced redistribution of populations. It also included the enactment of legislation to protect sensitive lands such as watersheds from agriculture, and to curb ecologically destructive practices, such as grass-burning early in the season, which led to fierce and uncontrolled fires. The third type of approach was to coopt local peoples and practices. This approach varied considerably from one context to another. There was, to begin with, a great deal of advocacy of education and practical demonstration. In addition were advocated methods of environmental management that involved local labour, such as the *taung-ya* system of regulating shifting cultivation. A similar enthusiastic endorsement was for methods such as the 'three-field system', wherein local cultivators were allowed to place two out of three fields under crops each season, allowing the third to regain some of its fertility; and systems such as rotational grazing, where similarly, a third of the area was to be left ungrazed during the summer months. Finally, there was the advocacy in certain areas of policies that encouraged the selection and allocation of village forest areas, using land least suited to agriculture. The idea was to give local peoples, in areas where scarcity of wood was being experienced, direct interest in protection by placing forested lands directly under the control of village headmen.[63]

In discussing possible approaches to alleviating the problem of soil erosion, foresters were guided by two main considerations. The first was to ensure maximum productivity and the best possible use of forest lands. In order to do this, foresters advocated the conducting of detailed surveys of land classification to determine the most economic use to which each portion of the catchment should be put, and a delineation of the sectors which needed to be maintained permanently as forests.[64] There was, argued a forester from India, a need for

> land planning schemes to produce best land use, get the necessities of life from land to get maximum production out of it and to put each land to the right purpose.[65]

[63] What is particularly striking is the unanimity of approaches from foresters from different parts of the Empire. Each of the above approaches was suggested in different ways by the various foresters participating in the discussion: J.B. Clements from Nyasaland; J.R. Ainslie from Nigeria; H.W. Moore from the Gold Coast; R.W. Thornton from Basutoland, Bechuanaland and Swaziland; Professor R.S. Troup of the Imperial Forestry Institute and formerly, the Indian Forest Service; E.A. Garland from India; G.N. Sale from Trinidad; D.G. Thomas from Sierra Leone; and F.M. Oliphant of the Colonial Forestry Services.

[64] A.V. Galbraith, *PEFC*, IV, p. 113.

[65] A.P.F. Hamilton, *PEFC*, IV, p. 81.

Similar views were expressed by a forester from British Guinea who argued that the issue was largely one of economics, a question of what crop and practice was best suited given social and ecological conditions. There was, he argued, a need for a proper study of the economics of marginal lands. There was no reason why under certain conditions practices such as shifting cultivation could not be made more profitable economic propositions than forest crops. It was therefore urgent, he argued, for proper economic surveys to be undertaken to determine what the optimum yield from these lands was.[66]

Underlying the perspectives on the problem of soil erosion advocated by the Empire forestry community at the conferences was the conception that forests constituted a productive entity distinct from others, especially agriculture. A related conception was that agriculture was not necessarily the best form of land use. Such perspectives were articulated by supporters of forestry from the early nineteenth century and became an important element of the colonial forester's mentality since the days of Dietrich Brandis, the first Inspector-General of Forests of British India.[67]

Significantly, similar ideas began to be expressed by forest officers recruited directly from the Empire, as opposed to Britain. Harnam Singh Pathania, a forester of Indian origin, for example, argued that good land management had to be based on proper surveys. He said that land ought to be examined by units of areas and that any areas not fit for cultivation ought to be set aside for afforestation. The bigger lands, he argued further, ought to be transferred to the forest department and the smaller ones converted into the village forests. He advocated the establishment of land utilization boards to oversee such processes. Moreover, he felt that attempts should be made to convince other departments about the need to set up small forest areas which would meet the fuel-wood needs of local populations, thereby saving farmland manure now being used as the only fuel.[68]

Another aspect of the approach adopted by foresters on the issue of soil erosion was their appreciation of the 'indirect effects' of forests. Mature forest, they argued, was the best preserver of both climate and soils, and good soil, they argued further, was the best reservoir of water.[69] The solution to the problem of erosion therefore was to create forest reserves wherein denuded areas would be reforested. Here the basic principle was to preserve vegetation and to increase the area of forests. Another principle was to create subsidiary control measures, such as river plantings, and to establish minor structures on the upper reaches of streams to prevent further erosion, pending improvement to highland sectors.[70] There was concern also for the adequate protection of

[66] C. Swabey, *PEFC*, IV, p. 83.
[67] See Rajan, *Modernizing Nature*.
[68] Harnam Singh Pathania, *PEFC*, IV, p. 104.
[69] Keet, *PEFC*, IV, p. 116.
[70] Galbraith, *PEFC*, IV, p. 113.

forest areas from fire and for the revocation of methods under which highland areas were leased for grazing.[71]

The response of foresters to agriculture-related issues such as soil erosion, as with shifting cultivation, was largely shaped by the belief that they were simultaneously economic producers and environmental guardians. Such a mindset, as argued earlier, has its roots in the disciplinary ethos of continental forestry, in which colonial foresters were trained and imbibed. Colonial foresters therefore saw their duty as that of diagnosing such problems quickly and solving them effectively. To adapt a phrase initially used to describe colonial conservationists in general, theirs was an ideology of 'doom and resurrection', stemming from the fear that but for urgent action marginal lands, especially forests, would be taken over and destroyed.[72]

Their approach also reflected their underlying technocratic rationality. To begin with, they identified the problem of soil erosion as primarily an environmental one. They never raised the question of the social reasons, other than demographic, which forced people to engage in ostensibly ecologically destructive practices. Their diagnosis was often couched in patronizing terms, blaming traditional peoples for mismanaging the lands. Their purported solutions in turn were either directly technological or involved various forms of technocratic closure, ranging from outright exclusion to systems that controlled and channelled local ecological practices. In this, they were similar to other colonial technological communities who began to advocate conservation at that time. Indeed, their approach very clearly fits the chart made by Piers Blaikie illustrating what he calls the 'classic' or 'colonial' approach to agroecological conflicts (Chart 1).

Chart 1
The Technocratic Perception: Environmental Protection

Problem	*Symptoms*	*Causes*	*Solutions*	*Consequences*
REGION X has an → Environmental crisis	Desertification →	Overpulation → {overgrazing} {overcultivation}	Family planning →	Lack of response
	Deforestation			
	Soil erosion	Ignorance → {tradition {culture {inapp. practices	Education → Change attitudes Demonstrate new ideas →	Inappropriate knowledge =frustration Short-term palliatives
	Catchment loss			
	Silting			
	Decline of rivers	Lack of → evironmental awareness	Environ- → mental education and EIA	Rationalizing oppression
	Decline of food production			

Chart 1 continued

[71] *Ibid.*, p. 113.
[72] Beinart, 'The Politics of Conservation'.

Chart 1 continued

Problem	*Symptoms*	*Causes*	*Solutions*	*Consequences*
		Inadequate → legislation	Tougher → legislation	Oppression and polarisation protect environment against people
		Institutional → weaknesses	Integration → Min. of the Environment	New and more efficient ways of avoiding problem

Source: Adapted from P. Blaikie, *The Political Ecology of Soil Erosion in Developing Countries*, London, 1985, p. 57.

Some Wider Issues

The diagnosis of the nature and causes of colonial agroecological crises made by foresters at the Empire Forestry Conferences during the period 1920–1950, however, also indicates a sharp critique of the attitudes adopted by other (i.e., non-forestry) colonial governmental agencies, technical and non-technical. There was, to begin with, an explicit belief that governmental bureaucrats could not comprehend the extent of such problems. It was argued that governments did not appreciate the indirect advantages of forests since they seemed inclined to regard their forest properties 'more and more from the monetary or financial point of view'.[73] The public were similarly perceived of as not being aware of the importance of the connection between erosion and deforestation and the impact of this on water supply.[74] They pointed out that there were, in some parts of the empire, alarmists who argued that forests were not the most efficient ways of conserving the water supplies.[75]

In addition to governments and the public, foresters at the Empire Forestry Conferences also blamed other colonial technical communities, such as engineers and geologists. In Nigeria, it was argued, geologists claimed that there were no records of any fall of the water level and that there was no evidence of desiccation. The old historical evidence, foresters claimed, however, corroborated the beliefs of the foresters and not that of the geologists.[76] Again, in South Africa, they argued, reservoir engineers, realising that all plant growth, like all living matter, must use water to live and grow, demanded that catchment areas be paved with bare rock or land covered with malthoid. They did

[73] Richmond, *PEFC*, III, p. 188.
[74] Gay, *PEFC*, III, p. 193.
[75] Keet, *PEFC*, III, p. 116.
[76] Ainslie, *PEFC*, III, p. 119.

not realise, argued foresters, that in the absence of filtered storage which made up water supply and also the control and utility thereof, it was not vegetation but soil as a product of decomposition of vegetation and of climate that was the reservoir for rainfall.[77] Finally, in Canada, a great deal of the problem of stream flow caused by timber operations and pulp, lumber and paper manufacture was, argued foresters, a result of engineers not appreciating the importance of forests.[78]

The worst criticism was however reserved for agricultural officers and populations engaged in agriculture. Speakers from across the Empire claimed that agricultural officers often ignored the advice given by foresters. It was also argued that agriculturists were ignorant and apathetic about the importance of forests and forestry. This perception was furthered by the frustration that colonial governments often preferred the views of agricultural officers on land use to the suggestions made by foresters. Some foresters therefore used the language they normally reserved to condemn local peoples and their practices to condemn agriculturists:

> At the very beginning, man existed without agriculture; he subsisted upon the forests. It was the agriculturist who dispossessed the forest and raped the earth wherever he went. The forest services must now accept the responsibility to repair the sins of the agriculturists. I suggest that foresters should resume their place of being the complete conservationists.... When I recall how...forests were pushed aside, how governments of the day, through their land departments, threw open sections to all and sundry with the idea merely of dispossessing the unemployed and of cashing the capital resources of the country, then I find myself believing that only by expression of the utmost energy of the Forest Services both in defence and offence can we redeem our traditional responsibilities to the earth.

Although colonial foresters were quick to blame other communities, they themselves refused to even consider criticism of their practices made by colonial officials and others who were not foresters. An excellent illustration of this was a fascinating exchange between foresters, agriculturists and other scientists on the issue of the impact of exotics in southern Africa, and particularly its role in producing aridity and erosion.

In the semi-arid parts of southern Africa, argued John Phillips, Professor of the University of Witwaterstrand, stands of exotic species such as gums, wattles and some pines resulted in washing and erosion whereas those of natural species did not.[79] While springs had ceased flowing in exotic plantations, springs and streams in the open veld where that veld had been looked after,

[77] Keet, *PEFC*, III, p. 114.
[78] Finlayson, *PEFC*, IV, p. 123.
[79] John Phillips, *PEFC*, IV, p. 124.

did not cease flowing. He claimed that research had explicitly shown that gums and wattles had water requirements and rates of water usage and transpiration considerably greater than indigenous species. This was true especially of the pines. Moreover, argued Phillips, agriculturists, pastoralists and horticulturists could point out that grass herbage and fruit trees were either stunted and poor-bearing, or that they died altogether when within twenty to thirty feet of shelter belts of gums. There was evidence that much of the litter that fell from these exotics was not incorporated into the soil, but lay on the surface for a long period, ultimately disappearing largely in a gaseous form and not being incorporated into the humus of the soil. Given this kind of evidence, Phillips argued that it was imperative that these matters be looked into 'scientifically and dispassionately'.[80] There was, he argued, need for critical, long-term experimental research into these matters, including issues such as the relation of planting to water supply, the effect of habitat development studies on the soil and the studies on the relation between afforestation and succession.[81] In particular, he argued that it was a 'mark of defeat' if being charged with the sylviculture of the native forests, exotics had to be invoked for management when other methods could be found for the purpose.[82]

A similar sentiment was echoed by others. Roberts, a South African engineer, for example, stated that from the point of view of anti-erosion work, indigenous bush was of great advantage because indigenous forests did not draw on the water in the soil as heavily as the exotics did. Also, he argued, their growth was such that they did not stand alone. They were accompanied by all forms of shrubs, grasses and other vegetation which blended together to form a complete protective mat.[83]

Foresters however totally dismissed such ideas. J.A. Keet, a member of the South African Forest Department, who spoke first, made a spirited defence of exotics, which he claimed had been criticised by many of his compatriots. Denying that in planting exotics South African foresters had ignored an ecological outlook, he argued that just as a farmer does not plant the exotic apple in the low veld or the exotic citrus on the high veld, foresters did not plant exotic custer pine on the coastland of Zululand or the exotic gum on the mountains of the Free State. The issue was not whether exotics were good or not but the conditions under which they were appropriate. Here, he claimed, the South African forester could 'teach the world something about the knack of matching species to growing sites'. The South African forester, he stated worked in conformity with ecological principles. He claimed further that there was no evidence to indicate that exotic trees acclimatized to their new home were any more desiccators of their climate than they were in their native

[80] *Ibid.*, p. 125.
[81] *Ibid.*, p. 127.
[82] *Ibid.*, p. 126.
[83] Roberts, *PEFC*, IV, p. 131.

Again, in the case of the problem of soil conservation, it was a commitment to German forestry principles that broadly dictated the approach of British colonial foresters. What distinguished the approach of foresters on the issue of soil erosion, as with shifting cultivation, was their predominant concern to promote the cardinal forestry principles of the balance sheet and sustained yield as well as their perception of themselves as environmental guardians.

The deliberations on shifting cultivation and soil conservation at the conferences also reaffirm the traditional biases of foresters against local peoples. People on the move, such as swidden cultivators, were especially seen as doubly immoral—in the sense of being bad citizens (evading taxes), and in being environmentally profligate.

What is interesting, however, is that there were a different set of biases against those of their own kin who were not foresters. There were thus biases against white settlers and their ostensibly wasteful and apathetic attitudes towards forest resources and towards governments and civil servants who did not as yet subscribe to the vision of the forestry community. The discussions thus posed the differences in attitudes between foresters and other people, white or native, in civilisational terms: non-foresters, including members of legislatures, had to be educated and civilized.

Such views arguably had their roots in the growing scientism and technocracy of the Empire forestry community. The deliberations on shifting cultivation and soil erosion show the forestry community perceiving itself as being fundamentally superior to other communities, native, white settler, governments and legislatures, on the question of how best to manage forests. This feeling of superiority stemmed from the idea that as scientists, foresters were better educated on matters of forest use. It is also possible that the increasing convergence of scientific disciplines into the forestry realm in the twentieth century contributed to this feeling of superiority.

Finally, the examination of the conference deliberations on shifting cultivation and especially soil erosion indicates something that has largely escaped much of the recent historical analysis of colonial conservation policies—the idea that the colonial state was as differentiated and desegregated as it was homogeneous. The deliberations of the Empire Forestry Conferences indicate that although the basic response of colonial foresters was in many respects similar to that of the 'colonial officials' described in the analysis made in recent work on colonial environmental history, their motivations lay in a concern to systematically manage classified forest lands (actual and potential) according to the principles of forest science. Seen from this overall perspective, the approaches of other colonial officials, such as agriculturists, appeared to foresters as fundamentally flawed.

habitat. Moreover, the exotic trees in South Africa, the gum, the pine and the wattle, often acted as 'pioneers' to indigenous species, even to the moisture loving ones, and showed more clearly than any measure of soil measure, light intensities and temperatures that 'we are on the right lines with our exotic species'.[84]

There were some foresters who steered a middle course. Carlson, an elderly South African agricultural officer, for example, stated that the issue was not one of indigenous versus exotic species but the right mixture of species. Exotics, he argued, could be deployed provided they were mixed adequately with others.[85] The reaction of the forestry community, however, was unanimous applause for the hardliners like Keet.[86]

Conclusion

The discussions on shifting cultivation and soil erosion at the Empire Forestry Conferences show that Empire foresters approached such questions largely from their disciplinary standpoint as foresters. They, thus, emphatically articulated and argued for an explicit paradigm of dealing with the forests of the Empire, a paradigm that emphasised the sylvicultural goals of Continental forestry which were in turn geared to the needs of an industrialising modern state. The paradigm also had a strong cultural aspect. Part of its normative appeal for its protagonists, the Empire forestry community, lay in its advocacy of material progress through an ostensibly universal technology which enabled, to use the words of Alexander Spoehr—an American cultural anthropologist of that period—the exploitation, not just of 'single landscapes, separately', but 'pooling and redistributing the products of all types of environment'.[87]

In the discussion on shifting cultivation, therefore, the discussions at the conferences show that rather than being unilaterally opposed to shifting cultivation, as existing historical studies indicate, colonial foresters located the issue within wider priorities of forest management, and especially the question of the political economy of forest regeneration. Their predominant approach ultimately was to control and adapt what was otherwise considered an ecologically recalcitrant practice to enable them to manage forests according to the principles of the balance sheet, sustained yield and minimum diversity. This approach enabled participating foresters to begin to think beyond the specific needs and issues of their respective regions. Shifting cultivation, with appropriate pragmatic controls, thereby emerged as a mainstay of pan-colonial forest policy.

[84] Keet, *PEFC*, IV, p. 117.

[85] Carlson, *PEFC*, IV, p. 131.

[86] The discussion on exotics, *PEFC*, IV.

[87] A. Spoehr, 'Cultural Differences in the Interpretation of Natural Resources', in W. Thomas Jr, ed., *Man's Role in Changing the Face of the Earth*, Chicago, 1956, Vol. 1, p. 95.