

Macroeconomic and Environmental History: The Impact of Currency Depreciation on Forests in British India, 1873-1893*

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wish the Committee to bear this fact prominently in mind, that right throughout the statement I have to make, the one difficulty with which the Indian Government have to contend is the fall in exchange—it has a blighting and withering influence in every direction.

Lord George Hamilton, Secretary of State for (British) India.¹



Introduction

The impact of macroeconomic variables on the environment has been widely explored by economists and policy analysts. These studies have, however, by and large dealt with contemporary concerns. Since the 1980s many developing countries facing severe macroeconomic imbalances have been forced to adopt structural adjustment programmes (SAPs). Such programmes, it is argued, have had an adverse impact on their environment, particularly under the form of increased rates of deforestation. In this paper, I attempt to study something similar, though not quite the same. In the third quarter of the nineteenth century, India went through a distinctive phase in terms of the value and stability of its currency, the rupee. This is evident in Graph 1, which shows the exchange rate of the rupee between 1835 and 1914.² The periods 1835 to 1873 and 1893 to 1914 were clearly ones of relative stability in the rupee-sterling exchange rate as compared to the period 1873-1893, over which the rupee depreciated by almost 50 per cent. This exogenously induced disturbance in currency value affected several other macroeconomic elements, including the quantum of home charges that had to be remitted annually to Britain, government revenues and expenditure, debt and investment, and foreign trade. Did these macroeconomic changes, which are akin to certain effects of SAPs, have an impact on India's environment? Finding an answer to this question defines the objective of this paper. The issue is hitherto unexplored in Indian environmental history.

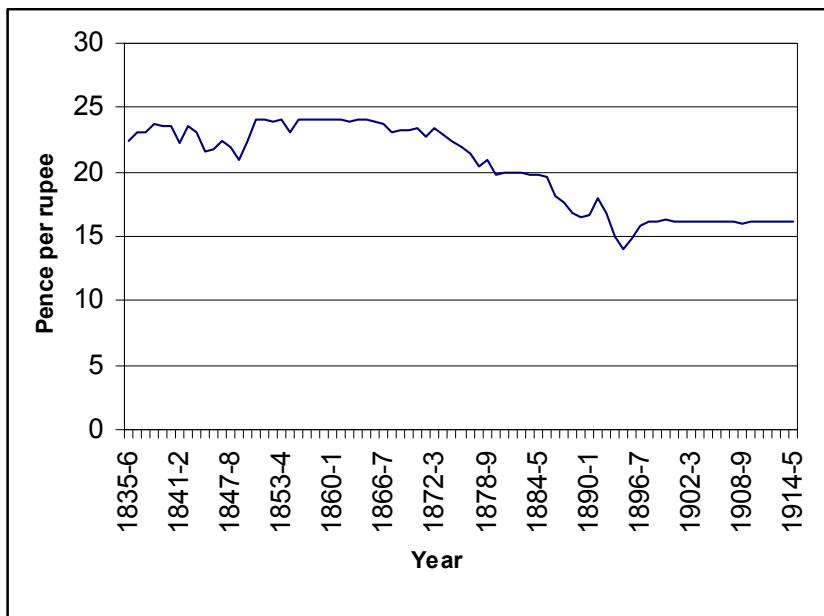
I begin with a search through some recent studies on SAPs and the environment for possible linkages between macroeconomic and

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¹ UK Parliament Proceedings, 4 September 1895, http://hansard.millbanksystems.com/commons/1895/sep/04/east-india-revenue-accounts#S4V0036P0_18950904_HOC_44.

² £-s-d or pounds-shillings-pence was the pre-decimal coinage of Britain in which 12 pence (12d.) = 1 shilling and 20 shillings (20s.) = £1. This made 240d. = £1.

Graph 1. Sterling-Rupee exchange rate



Source: B.R. Ambedkar, *History of Indian Currency & Banking*, Second Impression, Thacker and Company Limited, Bombay, 1947, pp.66-67 and 174.

environmental variables. Having done so, I present an abridged account of India's currency history from 1835 to 1917 followed by a qualitative evaluation of the discourses during and of that period on how this currency depreciation had a "blighting and withering" - though sometimes quite the opposite - influence on various macroeconomic elements. If indeed the macroeconomic impact of a falling rupee was as significant as it was made out to be by commentators of that time, then it is my contention that the ensuing effect on the environment could also have been important.

The environment-sensitive variables I have chosen to investigate are restricted to those related, directly or indirectly, to forests, such

as revenues from forests and forestry, timber exports, increased area under cultivation of food and commercial crops, expansion of plantations, a slowing down or increased investment in sectors like the railways and public works, and forest policy.³ Given that we find only sparse mention of specific and direct linkages between the rupee-sterling exchange rate and the environment, I will attempt to deduce possible connections in two stages: first, between currency depreciation and various macroeconomic phenomena; second, between these macroeconomic phenomena and environmentally sensitive variables. Moreover, since currency depreciation could have affected environmentally sensitive variables in contradictory directions, and many of the effects are not discretely observable in quantitative data, the nature of my analysis will be more exploratory than computational.

The final section will summarize the justification for and findings of my study, and in doing so will also critique Indian environmental historical research, which I believe has either failed to recognize or not given adequate importance to the environmental impact of macroeconomic disturbances.

The Contemporary Discourse on SAPs and the Environment

As mentioned in the Introduction above, this paper perceives an analogy between the impact of the World Bank's SAPs on the environment and the depreciation of the rupee in the nineteenth century. It is important for me to make clear that my brief review of contemporary discourse on SAPs is not intended to be an evaluation of empirical results or methodologies adopted by these studies; rather, its purpose is specifically to cull out articulated *theoretical linkages* between macroeconomic and environmental variables. I will then attempt to make a case of their relevance and importance in the context of Indian history.

The oil shock of the 1970s, growing foreign debt, mismanagement of domestic economies, and the tightening of interest rates

³ Other variables pertaining to the environment like soil erosion, wildlife, biodiversity and water resources have been left out of our study.

on foreign borrowings led to a financial crisis in many developing countries in the 1980s. As growth rates plummeted and unemployment soared in these countries, their governments turned to the World Bank and International Monetary Fund (IMF) for bail-out packages to service their debt and allow them continued access to foreign loans. However, these packages came with a set of terms and conditions widely referred to as “structural adjustment programs”, or SAPs, which aimed at comprehensive economic reform of their financially unsound domestic economies and unsustainable policies and programs. It is not the objectives of SAPs, namely growth, efficiency, alleviation of poverty and sustainable development, that are *per se* controversial. Rather, opponents to these market-oriented reforms contend that the various instruments of SAPs lead to outcomes that are in fact contrary to the stated objectives, amongst which is their negative impact on environment and sustainability.

Broadly speaking, SAPs have promoted the removal of all kinds of distortions in the internal and external tax structure, price controls, subsidies, fiscal policies and asset ownership to allow economies to become more competitive and their production more in line with resource endowments and comparative advantage. Among the instruments and policies implemented under SAPs, of specific interest to us are:

- Devaluation of domestic currency⁴
- Reduction of fiscal deficits
- Increased inflow of foreign investment

One way that crisis-ridden countries can alleviate their difficulties in servicing foreign debt is by letting the market determine exchange rates between domestic and foreign currencies, and then opening their economies to foreign trade. Exchange rates are essentially the price of home currency vis-à-vis foreign currencies and should reflect market demand for and supply of currencies. An overvalued currency, i.e., an excessively high price of domestic currency encourages imports but makes exports uncompetitive, thereby putting a country's trade ac-

⁴ Devaluation is a planned and purposefully executed correction in exchange rates, whereas depreciation in currency value is an outcome of market forces.

count in perpetual deficit. If countries are to be in a position to service their debts by having a trade account surplus, a devaluation of their home currency is essential, so that exports become more competitive and imports costlier. For many underdeveloped countries, given their comparative advantage in primary products like minerals and metal ores, agricultural commodities and forest produce, currency devaluation and the consequent increased exportation of these products are expected to adversely impact the environment. An example is Mali, where SAPs led to an increase in the area under cotton cultivation from 14,000 acres in 1960 to 63,000 in 1993.⁵

However, many studies have found no overriding empirical evidence to wholly support the claim of pessimists who reject SAPs *in toto*. Countries which do not have a comparative advantage in these environmentally sensitive goods would actually not see any increase in their rates of deforestation. On the other hand, those countries which do have a comparative advantage in such products, and are forest-rich, may experience an increase in exports with "a negative impact on the forest and biodiversity sectors, although they would contribute to the overall economic restructuring".⁶ Nonetheless, I will attempt to study the relevance of this linkage between exchange rate changes and environmental variables in Indian history.

Another important policy in SAPs is the control and correction of domestic fiscal or budgetary imbalances. Many developing countries were spending in excess of their revenue earning capacities because of internal mismanagement and external shocks. The consequences of budgetary deficits were many and serious: high inflation rates, high interest rates to enable government borrowing, high exchange rates of domestic currency, trade account deficits, crowding out of private investment, and poor credit worthiness. The overall result of all these effects was, however, one: a lower long-term economic growth rate of the

⁵ J. Winpenny, "Case Study for Mali", in *Structural Adjustment, the Environment, and Sustainable Development*, D. Reed (ed.), Earthscan Publications Limited, London 1996, p. 96.

⁶ R.A. Sedjo, *Macroeconomics and Forest Sustainability in the Developing World*, Resources for the Future, Discussion Paper, DP 05-47, 2005, p. 9.

economy. Under SAPs it was, therefore, considered of utmost priority to pressurize countries to correct their budgetary imbalances, which essentially translates into reducing expenditure and increasing revenues.

Efforts to increase government revenues usually focus on widening the tax base and more efficient administration of tax collection. Government revenue can also be enhanced by generating higher returns on the government's investments, including those in public sector enterprises or other commercial activities. Generating resources from privatization of state-owned enterprises to repay debt and thereby lower annual interest outgoings has also been considered an important policy option. On the expenditure side, governments may resort to cuts in the recruitment of new employees, subsidies and credit facilities, poverty alleviation programmes, health and education spending, and so on. In many cases, such expenditure-reducing policies could directly affect forestry and environment protection programmes. There could also be indirect impacts of expenditure cuts on deforestation; for instance, a reduction in agricultural subsidies and credit could force small and marginal farmers to expand cultivation into marginal lands, especially forests, to maintain crop yields.⁷ Once again, the currency regime in Indian history led to a situation wherein budgetary control became crucial; the then Government of India had to look at ways and means to increase revenues and, at the same time, curtail its expenditure. If correction of fiscal imbalances can be hypothesized as affecting the environment in contemporary economies, there is no reason why this may not have been so a century and half ago, especially in a situation where "the rural sector, comprising agriculture, and ancillary activities such as animal husbandry, forestry and fishing, was the foundation of the colonial economy".⁸

A key component of SAPs has been the removal of barriers inhibiting the free flow of capital across nations. The increased inflow of foreign capital is seen as unfavourable to the environment because

⁷ J.M. Shandera, E. Shor, G. Maynard, and B. London, "Debt, Structural Adjustment, and Deforestation: A Cross-National Study", in *Journal of World-Systems Research*, XIV, 1, 2008, p. 3.

⁸ B.R. Tomlinson, *The Economy of Modern India, 1860-1970*, Cambridge University Press, New Delhi 1998, p. 30.

of increased activity in sectors in which developing countries have a comparative advantage, such as mining, logging, ranching and agriculture. Although hypothetically convincing, the empirical validity of these claims has not been established. This link between foreign investment and the environment may, however, have been very important in Indian environmental history given the importance of foreign investment flows into the construction of the railways, public works and agriculture-plantation based industries.

As mentioned above, the question of the existence of a link between SAPs and the environment, which many studies have sought to establish or reject, is beyond the scope of this paper. For the sake of completeness it is only necessary to mention that the general conclusion that emerges from these studies is the difficulty “to demonstrate *empirically* a connection between structural adjustment programs and deterioration of forests”.⁹ This is because the perceived theoretical linkage between SAPs and forest cover outcomes assumes a homogenous context; in reality this is not so. Variations across countries and local situations – including the ways in which governments may react, in regulatory terms, to changes in economic trends – make the prediction of cause and effect in this area extremely difficult. Perhaps the directional impact of SAPs or development policy lending (DPL) is best summarized in a World Bank report:

This document ... asserts that it is clear that relatively large-scale economic changes *can* have significant impacts upon forests. However, there is great variability in outcomes in forests from such changes across the many different countries and situations covered in the studies reviewed. ... It also is clear that the generic model referred to above cannot be built at this point. Further information on what is driving the observed changes locally ... is necessary.¹⁰

India's Currency History, 1835-1914

India's colonial currency history from the beginning of the nineteenth century till its independence from British rule can be divided into several

⁹ Sedjo, *Macroeconomics and Forest Sustainability* cit., p. 12. Emphasis my own.

¹⁰ World Bank, *Development Policy Lending and Forest Outcomes Influences, Interactions, and Due Diligence*, Report n. 33537-GLB, 2005. Emphasis original.

more or less well defined periods.¹¹ I focus here on the 1835-1914 period, which includes the phase of currency depreciation, 1873 to 1893. Before analyzing the linkages between currency depreciation and macroeconomic and environment-sensitive variables, I will briefly describe the underlying currency regime and the basis for stability and causes of instability in rupee-sterling rates over the period under investigation.

1835-1873

The starting point chosen for this study is 1835, the year when British India went on to a monometallic silver currency. By Act XVII of 1835, the silver rupee was made the standard coin of India. With the transfer of rule from the British East India Company to the Crown in 1858, India was no longer under the control of just one company; it became accessible to all of Britain's industrialists and financial capitalists. With this, India's exports grew and so did investments in the country. In spite of an inflow of gold into the country, this was not usable for currency. Therefore, a large amount of silver had to be imported into India, but, given the country's craving for precious metals, the amount of silver available for trade and commerce remained deficient. Although this phase (1835 to 1873) within the 1835 to 1893 period witnessed a failed effort at putting India on a gold standard, the one thing that distinguished it from the next phase (1873 to 1893) was stability in the gold/silver ratio. Over the previous two hundred and fifty years, the gold/silver price ratio had fluctuated only slightly, within a range of 1:13.75 to 1:15.25. In 1870-71, with the gold price of silver at about 60d. per ounce, the Indian rupee was worth fractionally less than 2s. By 1893, the gold price of silver had gone down to just 39d. per ounce, so that the Indian rupee became equivalent to just 1s.3d.¹²

1873-1893

Even as India continued to remain on a monometallic silver standard, the 1873-1893 period was truly dramatic. The gold/silver ratio,

¹¹ See D.K. Malhotra, *History and Problems of Indian Currency, 1835-1949: An Introductory Study*, Fifth Edition, Minerva Book Shop, Simla 1949.

which had maintained parity over centuries, was disrupted forever. With Britain on a monometallic gold standard and India on a silver standard, the breakdown in parity was reflected in disruption of a stable sterling-rupee exchange rate, with the rupee depreciating from Rs.10 to Rs.15 per sterling pound over 20 years. The reasons for this change in exchange and parity rates were, in the first place, the dropping of silver as a money medium by the principal countries of the world, and secondly an increase in the production of silver relative to gold.¹³ Though these reasons are contradicted by facts relating to the actual production of gold and silver, it is not necessary to delve further into the cause of the depreciation; most important to us is the fact that the depreciation was triggered by external and exogenous factors and was not due to India's balance of payments position.¹⁴

Throughout the period it was hoped that the price of silver would stabilize. The silver producers' interests in sustaining demand for the metal maintained pressure on the U.S. government to establish bimetallism. Many international conferences were held, in which India too participated, but the final outcome at the International Monetary Conference held at Brussels in 1892 sealed the fate of silver. The U.S. decided to abandon its pursuit of bimetallism and adopt a pure gold standard.

1893-1898

When the U.S. announced its decision to give up the proposal for a bimetallic standard, and therefore the purchase of silver for currency, the gold price of silver witnessed a further fall. It was only after 1898-1899 that the rupee stabilized and managed to maintain a minimum value of greater than 1s.3d; the reason perhaps being the general increase in the demand for rupees among a growing population, and a greater quantum of economic activity.¹⁵ The 1893-1898 period is regarded as one of transition.

¹² Malhotra, *History and Problems of Indian Currency* cit., pp. 5-6.

¹³ See, *ibid.*, Chapter IV and B.R. Ambedkar, *History of Indian Currency and Banking*, Butler & Tanner Ltd, London 1947.

¹⁴ *Ibid.*, pp. 71-80.

¹⁵ Vakil, Muranjan, *Currency and Prices in India* cit., p. 65.

1899-1914

“For once it seemed that the problem of the depreciating rupee was satisfactorily solved”.¹⁶ Over the next fifteen years India witnessed a stable sterling-rupee exchange rate (see Graph 1). The system that had evolved from Britain’s hesitancy to put India on a pure gold standard was ultimately recognized as a “gold exchange standard”. Formally, we can say that this phase in India’s monetary history began in 1899 when the sovereign and half-sovereign were made legal tender at Rs.15 = £1 (or Re.1 = 1s-4d), vide Indian Act No. XXII.¹⁷ Under the gold exchange standard, gold was not used as currency, nor was a gold mint set up in India. The essential features of this system were that both gold sovereign and silver rupees were fully legal tender, with the government undertaking exchange of sovereign for rupees but not vice-versa. The intricacies of the gold exchange standard are beyond the scope of this paper; to us what is important here is the stability of the sterling-rupee exchange rate, which, as Graph 1 shows, endured until the outbreak of the War.

Currency Depreciation, Macroeconomic Environment, and Environment

The passion that the depreciation of rupee aroused is quite akin to the familiar outbursts of resentment against the World Bank and the IMF for their implementation of SAPs. A few remarks reproduced below will give a feel of how economists of the time perceived the situation. Vakil and Muranjan summarized the effect of this “evil” phase as “very grave” and one which put the people of India in “most serious difficulties”.¹⁸ MacLeod described it in the following terms: “A monetary crisis of the most momentous gravity has arrived in the affairs of India ... which have brought India onto the verge of bankruptcy. The Government themselves describe the state of the country as ‘intolerable’”.¹⁹ In the

¹⁶ Ambedkar, *History of Indian Currency* cit., p. 152.

¹⁷ One rupee is written as Re. whereas rupees are written as Rs.

¹⁸ Vakil, Muranjan, *Currency and Prices in India* cit., p. 34, 38.

Introduction to his book, Monson George stated that he had “endeavoured to call attention to the great evil to the universe, and India and Great Britain in particular, caused by the depreciation in the gold value of silver”.²⁰ According to Shirras, who was on special duty in the Finance Department of the Government of India, “No period of our currency history is so rich in literature as is the third period, 1874-1893 … the currency machine was the master of man, not the man of machine”.²¹ But, as we shall see, it is more than passion that makes the currency depreciation of the late nineteenth century comparable to SAPs.

There are three broad categories within which I seek to study the link between currency depreciation and the macroeconomic environment: budget, investment and trade. If these elements of macroeconomy were indeed severely impacted by the currency depreciation, it is quite likely that there could have been significant repercussions on the environment, particularly forests and forest policy. Figure 1 below outlines my line of argument.

Forests and the Budget

The depreciation of the rupee proved to be an “embarrassment” to the Government of India when its annual budgetary exercises began to go awry. Every year the Government had to reimburse the expenditure incurred in England by the Secretary of State for India. These “home charges” or “drain”, which had to be paid in (gold) sterling, needed a larger and larger amount of rupees with the falling gold price of silver.²² The situation worsened with the gradual increase in home charges over the years so that “the rupee cost of the gold payments grew both by reason of the growth in their mag-

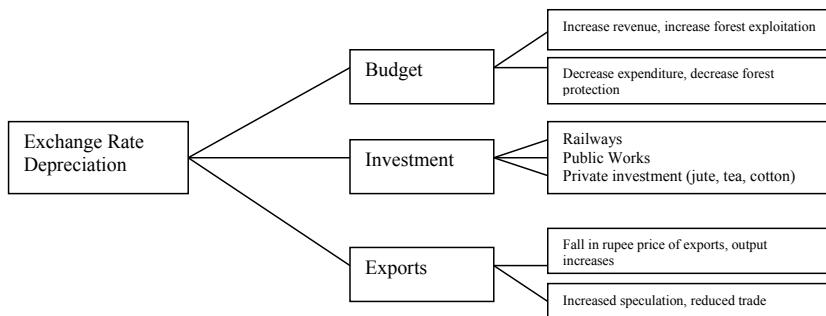
¹⁹ H. Dunning MacLeod, *Indian Currency*, Longmans, Green & Co., London 1898, p. v. Emphasis original.

²⁰ E.G. Monson, *The Silver and Indian Currency Questions: Treated in a Practical Manner*, Effingham Wilson & Co., London 1914, p. 5.

²¹ G. Findlay Shirras, *Indian Finance and Banking*, Macmillan & Co., London 1920, p. 114.

²² This “Drain” became a symbol of economic nationalism and rallying point for one of India’s earliest nationalist movements led by Dadabhoi Naoroji.

Figure 1. Possible impacts of exchange rate depreciation



nitude, and also by reason of the contraction of the medium, i.e. the appreciation of gold in which they were payable".²³ To Desai, it was not the home charges *per se* that were the problem; "The Drain created problems of repayment *because* it was incurred in terms of Pound Sterling then based on gold and paid in Rupees based on silver. Since the Rupee was depreciating against the pound the domestic burden of servicing the debt was getting heavier during 1870's and 1880's".²⁴ Between 1873 and 1893 the rupee value of home charges increased from 147 to 270 million; more than the combined revenues from land and customs duties.

In hindsight one might suppose that the problem the Government of India was undergoing at that time was merely a depreciating currency. However, it is important to realize that an even greater problem was the uncertainty in anticipating the gold value of silver and therefore the extent and duration of the fall in the rupee, which changed "as much as 17 per cent within the course of one year".²⁵

²³ Ambedkar, *History of Indian Currency* cit., p. 83.

²⁴ Lord M. Desai, *Drains, Hoards and Foreigners: Does The Nineteenth Century Indian Economy Have any Lessons for The Twenty First Century India?*, Reserve Bank Of India First P. R. Brahmananda Memorial Lecture, <http://rbidocs.rbi.org.in/rdocs/Speeches/Pdfs/58008.pdf>, p. 4. Emphasis my own.

²⁵ J. McGuire, "India, Britain, Precious Metals and the World Economy: The

As Walter Bagehot, editor of *The Economist*, put it in 1877, “How long the fall in the value of silver will continue no one can say”.²⁶ Sir David Barbour calculated that the additional burden imposed on the finances of India by the fall in exchange from 1s.6d. to 1s.5d. would be more than 10 million rupees.²⁷ The outcome at the end of each year was not only uncertain but also put increasing pressure on the Government of India to raise revenues to provide for unexpected contingencies emanating from the currency depreciation. Table 1 shows how differences in anticipated and realized rupee-sterling exchange rates impacted the budgetary process; making budget calculations and arrangements had become nothing more than illusory.

With limited revenue sources available to the Government of India and an increasing and uncertain expenditure, a crisis in Indian finance was fast developing. Even as early as 1877, Bagehot observed, “the whole interest of the debate on the Indian budget centered in the discussion on the value of silver”.²⁸ A few years later, the situation had become more serious: “The discussion of the Indian budget of 1879 in Parliament will not improbably be long referred to as marking the commencement of a new epoch in Indian finance.”²⁹ In 1880, Fawcett made an urgent plea: “Enough has probably now been said to prove that the time has arrived when, in order to restore the finances of India and prevent them from drifting into hopeless embarrassment, it is absolutely essential that the policy of ‘rigid economy in every branch in the public service’, which has been recently announced by the Government, should be carried out with promptitude and thoroughness”.³⁰ And in the early years of the last decade of the nineteenth century, Ellstaetter observed that “in

Role of the State Between 1873 and 1893”, in *Evolution of the World Economy, Precious Metals and India*, J. McGuire, P. Bertola, and P. Reeves (eds), Oxford University Press, New Delhi 2001, pp. 179-198, p. 181.

²⁶ W. Bagehot, *On the Depreciation of Silver*, Henry S. King & Co., London 1877, p. 6.

²⁷ Vakil, Muranjan, *Currency and Prices in India* cit., pp. 40-41.

²⁸ Bagehot, *On the Depreciation of Silver* cit., p. 66.

²⁹ H. Fawcett, *Indian Finance: Three Essays*, MacMillan & Co., London 1880, p. 115.

³⁰ Ibid., p. 149.

Table 1. Fluctuations in exchange and rupee cost of gold payments

Financial Year	Estimated Rate of Exchange on which the budget of the year was framed (s-d* per rupee)	Rate of Exchange actually realised on the average during the year (s-d per rupee)	Changes in the rupee cost of sterling payments consequent upon changes between the estimated and realised exchange rates. All figures indicate an increase in the necessary rupee outlay, except for those preceded by (-), which indicate a decrease.. ('000 rupees)
1874-75	1-10.4	1-10.2	1,591
1875-76	1-9.9	1-9.6	1,957
1876-77	1-8.5	1-8.5	(-76)
1877-78	1-9.2	1-8.8	3,843
1878-79	1-8.4	1-7.8	5,687
1879-80	1-7.0	1-8.0	(-8,440)
1880-81	1-8.0	1-8.0	424
1881-82	1-8.0	1-7.9	1,017
1882-83	1-8.0	1-7.5	3,746
1883-84	1-7.5	1-7.5	(-362)
1884-85	1-7.5	1-7.3	1,897
1885-86	1-7.0	1-6.3	5,682
1886-87	1-6.0	1-5.4	6,517
1887-88	1-5.5	1-4.9	7,190
1888-89	1-4.9	1-4.4	7,798
1889-90	1-4.4	1-4.6	(-2,731)
1890-91	1-4.6	1-6.1	(-23,551)
1891-92	1-5.3	1-4.7	8,009

* See footnote 2 for description of British currency denomination.

Source: B.R. Ambedkar, *History of Indian Currency* cit., p. 107.

the present depressed conditions of the rates of exchange the situation of the Indian Government has become decidedly critical. The amounts which are needed to meet the gold demands have become, owing to the renewed decline in the rates of exchange, even much greater than

was expected by Sir David Barbour in his very pessimistic estimate for 1893-4; and the deficit will accordingly be considerably greater". Rothermund considered that by 1893 "the bankruptcy of the British Indian government was imminent".³¹ The home charge, moreover, was not the only outgoing in terms of (gold) sterling; expenses for European troops maintained in India, pensions and non-effective allowances payable in England, and stores purchased in England for consumption in India were other payments that had to be remitted abroad. "In order that this deficit should not become chronic, the means of relief adopted must be drastic. This is only possible by either a reduction of expenditures, or by an increase of income", wrote Karl Ellstaetter.³² All this bears witness to the urgency and criticality of the situation of India's budget that had developed on account of the depreciation of the rupee and the consequent pressure on the Government of India to set right its burgeoning budgetary imbalances by increasing revenues and cutting back expenditures; an outcome not unlike what some countries later experienced under SAPs. It now remains to be seen how this increased pressure on revenue generation and expenditure cuts could have specifically impacted the environment at that time and whether there exists any tangible qualitative evidence to that effect.

Two main viewpoints hold sway in the study of colonial India's environmental history: one is that of Guha, who argued that "organized forestry in colonial India developed in response to the revenue and strategic needs of empire"; the other is exemplified by Grove, who claims that "the roots of Forest-Department practices lie principally in the desiccationist movement".³³ From these contrasting viewpoints, a consensual perspective has emerged that situates Guha and Grove's arguments in different periods. In the last decades of the nineteenth

³¹ D. Rothermund, *An Economic History of India: From Pre-colonial Times to 1991*, Second Edition, Routledge, London 1993, p. 43.

³² K. Ellstaetter, *The Indian Silver Currency: An Historical and Economic Study*, translated by J.L. Laughlin, University of Chicago Press, Chicago 1895, p. 73.

³³ A. Skaria, "Timber Conservancy, Desiccationism and Scientific Forestry: The Dangs 1840s-1920s", in *Nature and the Orient: The Environmental History of South and Southeast Asia*, R.H. Grove, V. Damodaran, and S. Sangwan (eds), Oxford University Press, Delhi 1998, pp. 596-635.

century the Forest Departments were transformed, “with commercial considerations of revenue becoming the warp to [their] weft”.³⁴ Based on a quantitative content analysis of the *Indian Forester*, Weil too agrees with the view that “the Forest Service embraced an increasingly exploitationist argument – emphasizing profits, the cultivation of commercial species, and the development of new minor forest products … (and) obviated the need for a broad based, ecological, understanding of forests”.³⁵ But why this shift in forest policy? To Weil, “the deeper reasons for the shift to a commercial orientation require consideration of the internal culture of the Forest Service along with its bureaucratic context – particularly its competition with, and sense of inferiority to, the Civil Service and the engineers”.³⁶ The Forest Policy Resolution of 1894 gave the district officer a superior position to the forester’s by officially declaring that “whenever an effective demand for culturable land exists and can only be met from forest area, the land should ordinarily be relinquished without hesitation”.³⁷

I, however, contend that a more obvious reason for this shift towards commercialization of forests may have been the growing pressure on the Government of India to generate additional revenue from new sources to meet its financial obligations. This pressure to generate revenues may have in fact been the root cause for giving District Officers of the Revenue Department an upper hand vis-à-vis the foresters; contrary to Weil’s argument that the Forest Department adopted a more commercial posture because of an inferiority complex towards civil services. Though many environmental historians agree that there was an increasing drift of the Forest Department towards “revenue generation”, we generally cannot find definitive statements that this was specifically triggered by the currency depreciation. A few remarks by an official of the Indian Forest Department, however, do suggest that this

³⁴ Ibid., p. 596.

³⁵ B. Weil, “Conservation, Exploitation, and Cultural Change in the Indian Forest Service, 1875-1927”, in *Environmental History*, 11, 2006, p. 337.

³⁶ Ibid., p. 322.

³⁷ Ibid., p. 335; *National Forest Policy 1894*.

³⁸ G.H. Strettell, *New Source of Revenue for India*, Marlborough & Co., London 1878. Emphasis my own.

change in attitude may have indeed been driven by a desperate need for revenue generated by the emerging crisis in the macroeconomy, including the depreciation of the rupee. George H. Strettell published a book entitled *New Source of Revenue for India* in 1878, a few years after the depreciation of the rupee, where he makes an ardent plea for the developing of extensive bamboo cultivation for paper-making.³⁸ The title of the book and a paragraph entitled “*Present time specially suited for this enquiry*” captures the link between the currency question and pressure on the state to increase revenues.

At a time when it is necessary to borrow eight and a-half millions to defray the expenses of famine relief, and *when the future of the silver question is wholly uncertain*, the importance of developing every source of wealth must be apparent ...³⁹

A careful reading of Strettell’s work and the underlying tone of his proposal reveals the sense of urgency and necessity for the Forest Department to raise revenues:

It has often struck me, while engaged in my official duties in the Indian Forest Department, that a large revenue might be derived from plants which are looked upon as mere weeds ... I should be failing in my duty, if I did not draw prominent attention to a source of revenue which has, for reasons which I have attempted to give, hitherto remained comparatively neglected. ... The raw material might be sold at such a price as to add considerably to the Imperial revenue ... My object in writing this essay is to show that the revenue of India may be largely increased ... It is because of the deep interest I take in the opening out of the fibre trade of India, and because I am convinced that an energetic and thorough enquiry into the subject will result in a great gain to the revenue of that country, that I have written this essay in the interests of the Government whose servant I am.⁴⁰

Though foresters like Strettell had obviously seen a pressing need for the Forest Department to generate revenues, some equally eminent persons argued, instead, that the Forest Department was not directly called upon to contribute to India’s increased need for revenue. The Strachey brothers, who modestly claimed that “there is hardly a great department of the administration for the management of which, at some time, one or other of us has not been responsible

³⁹ Ibid., p. 38. Emphasis my own.

⁴⁰ Ibid., pp. 37-38.

...”, commented specifically on the role of the Forest Department. Their tone is rather desiccationist:⁴¹

The stationary condition of the net forest revenue has been rather a matter of satisfaction than otherwise. The forest administration, which is of comparatively recent creation, looks to the future interests of the community more than to perfect profit, and is more occupied in the preservation and improvement of State forests than in realizing an immediate large revenue. The gross revenue is now, however, close to £700,000.⁴²

This remark is actually quite ambiguous because, in spite of absolving the Forest Department from profit-making, it nonetheless points out to an increase in gross revenue generation by the Department. And this trend of increasing forest revenues is borne out by other records as well, as shown in Graph 2, which refers to United Provinces (U.P.), and Graphs 3a and 3b, which refer to all of British India.

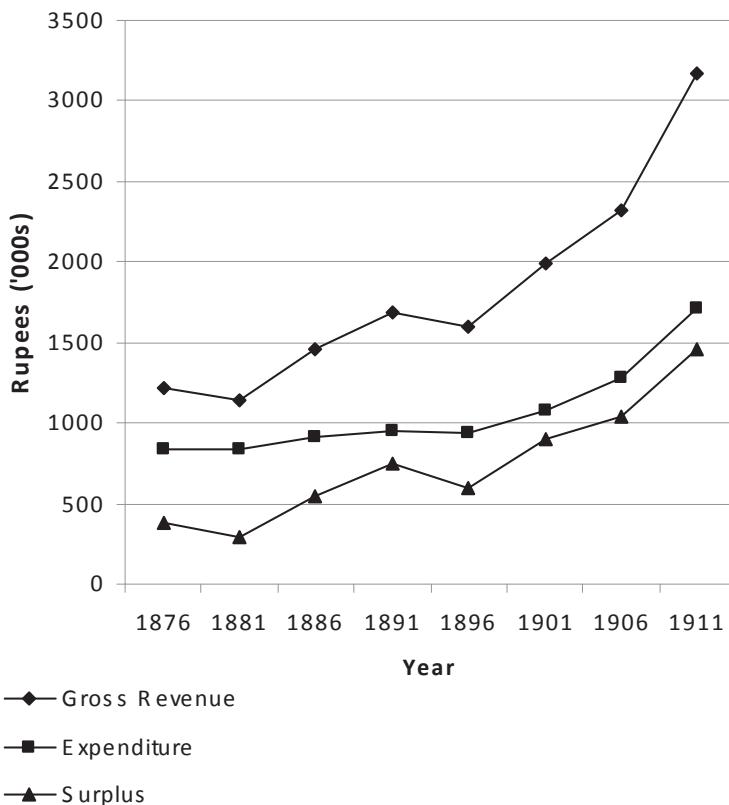
Although the trend in increasing revenues and surpluses illustrated in Graphs 2 and 3a coincides quite closely with the period of currency depreciation, one cannot hastily assume a definitive causal connection between them because, as is commonly known, this was also the period when the construction of the railways was driving up the demand for timber. However, the role of the Forest Department as a provider of timber to the railways was itself contested, and here too a conflict of views was fought out in which revenue generation gained the upper hand. In my treatise on environment change in colonial India, I pointed out that “differences emerged between different levels of government” as to whether sale of timber to the railways should be the priority of the Forest Department.⁴³ “The state government argued that forests were preserved at considerable cost and should be exploited for sale of timber and other produce without restriction. The Governor of Bengal, Sir Charles Elliot, initially disagreed, holding that this would interfere with afforestation,

⁴¹ Sir J. Strachey, Lt-Gen. R. Strachey, *The Finances and Public Works of India, 1869-1881*, Kegan, Paul, Trench & Co., London 1882, p. vii.

⁴² Ibid., p. 29.

⁴³ K. Sivaramakrishnan, *Modern Forests: Statemaking and Environmental Change in Colonial Eastern India*, Oxford University Press, New Delhi 1999, p. 137.

Graph 2. Forest revenue, expenditure and surplus: United Provinces

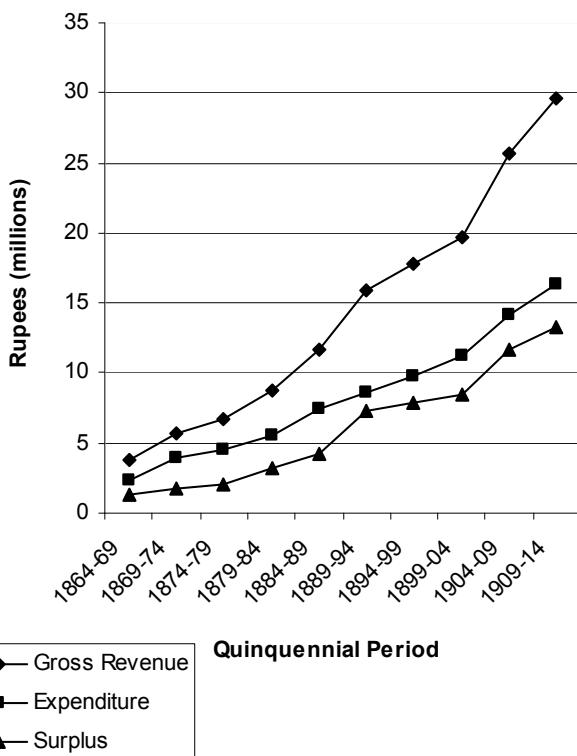


Source: C.G. Trevor and E. Smythies, *Practical Forest Management*, Government Press, United Provinces, Allahabad, 1923, p. 20.

which was for him the primary function of the Forest Department. That he had to defer to more pressing definitions of the Forest Department as a ‘quasi-commercial agency’ is not surprising given the large profits from forest operations in the first two decades”.⁴⁴

⁴⁴ Ibid., p. 137.

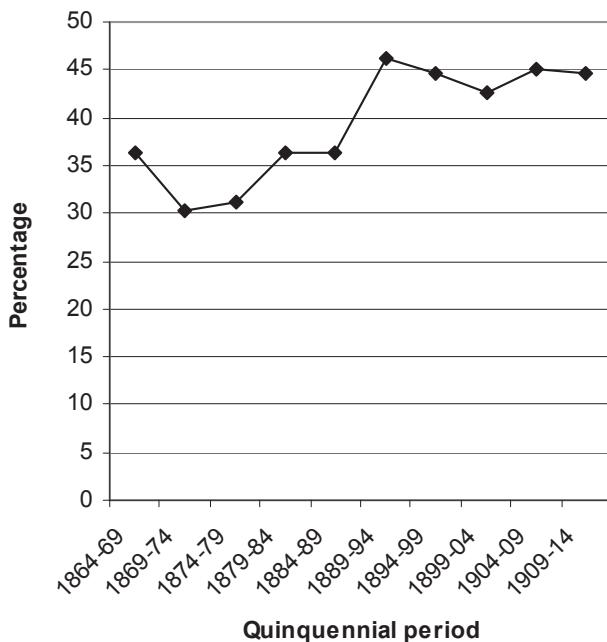
Graph 3a. Financial results of forest administration in British India



Source: R.S. Troup, *The Work of the Forest Department in India*, Superintendent Government Printing, Calcutta, 1917, p. 63.

Graph 3b also shows some interesting aspects concerning the Forest Department's expenditure. The ratio of surplus to gross revenues, which was around 36% in the 1860s, declined over the next two decades, but then began to increase steadily. This growth in absolute revenues and revenue/surplus ratio reflects the changing agenda of Forest Departments, which I believe was, to some extent at least, driven by "real" (or more precisely, monetary) macroeconomic dis-

Graph 3b. Percentage surplus to gross revenue in forest administration in British India



Source: Troup, *The Work of the Forest Department in India* cit., p. 63.

turbances rather than a more insidious “subtext in the story of the consolidation of imperial control over India”.⁴⁵

Investment Impacts on Forests

Like contemporary SAPs, the depreciating silver rupee also had an effect on foreign investment in India and consequently on the environment. The question, however, is whether a depreciating rupee had a net positive or negative effect on investment in India. Generally speak-

⁴⁵ M. Rangarajan, “Production, Desiccation and Forest management in the Central Provinces 1850-1930”, in Grove et al. (eds), *Nature and the Orient* cit., p. 576.

ing, a depreciating currency has contradictory effects on investment decisions. On the one hand, when the exchange rate of the currency of country X falls, foreign companies in country Y may increase investment because they can buy more per unit of currency Y. On the other, once they have invested, a continued depreciation of currency X would mean that profits, when repatriated in terms of currency Y, shrink. This is a disincentive for companies in country Y to invest in country X.

Ellstaetter argued that the net impact of currency depreciation on investment was negative: "If India had no depreciating standard, their industries would surely have had a very much larger capital at their disposal", indicating that the declining profit repatriation effect from continual rupee depreciation was dominant.⁴⁶ Other commentators of that time also seemed to think so. MacLeod (1898) conjectured that reduced inflow of capital to India due to currency depreciation between 1861 and the 1898 was more than £100,000,000.⁴⁷ In 1892 David Barbour, Finance Minister to the Indian Government, similarly articulated the impact of the depreciation on the construction of the railways: "The fear of a fall in silver, however, stands in the way of their construction ... the small, though certain, profit which Indian railways are likely to return for the first few years the risk of investing capital in a country with a silver standard deters the prudent investor, while such railways have no attraction for the more speculative".⁴⁸

The depreciation and instability of the rupee made the raising of capital increasingly difficult and expensive for both the Government of India and private investors. For instance, the government had to guarantee minimum returns on the stocks of the railway companies. Since this capital was raised in England, a decline in the gold price of silver obviously meant an increase in the quantum of rupee payments. In a dispatch to the Secretary of State for India, the government pleaded:

We are forced, therefore, either to increase our sterling liabilities, to which course there are so many objections, or to do without the railways required for

⁴⁶ Ellstaetter, *The Indian Silver Currency* cit., p.53.

⁴⁷ Dunning MacLeod, *Indian Currency* cit., p. 42.

⁴⁸ Sir D. Barbour, *The Silver Crisis: India's Financial and Commercial Sufferings*, J.E. Cornish, Manchester 1892, p. 5.

the commercial development of this country, and its protection against invasion and the effects of famine.⁴⁹

With almost 50 per cent of Britain's foreign investment abroad made in the transportation sector, a slowing down of investment in the railways would have had a "positive" environmental impact, given the sector's gluttonous demand for timber.⁵⁰ However, when we look at the growth rates in the laying down of railway tracks, they are so spectacular that it is hard to see any dampening effect of the currency depreciation on investment in this sector: "In 1860 there were about 850 miles of track open in the subcontinent, 16,000 by 1890 ...".⁵¹ An enormous volume of sleepers was required for this new construction. Each new mile of railway track required 1760 sleepers. One tree yielded 3 to 5 broad gauge and 6 to 10 narrow gauge sleepers.⁵² In spite of this growth rate in the railway network and the consequent demand for timber, it is difficult to dismiss the counterfactual claim that had it not been for the rupee depreciation these growth rates may have been even higher.

The development of other public works such as irrigation tanks and canals also suffered on account of the Government's difficulties in raising capital.⁵³ With inadequate domestic savings, the government had to tap foreign capital. As long as gold/silver parity existed, this was not problematic. However, when the gold price of silver fell the government had to increasingly issue sterling debt as foreign investors were not willing to hold rupee debt. This led to an increase in silver rupee expenditure in servicing sterling debt and outflows for repayment of principal on maturity, with the result that "the expansion of extraordinary public works did not proceed at a pace

⁴⁹ Ambedkar, *History of Indian Currency* cit., p. 90.

⁵⁰ R. John, G. Ietto Gillies, H. Cox, and N. Grimwade, *Global Business Strategy*, Cengage Learning EMEA, 1997, p.18.

⁵¹ Tomlinson, *The Economy of Modern India* cit., p. 55.

⁵² E.P. Flint, "Deforestation and Land Use in Northern India with a Focus on Sal (*Shorea robusta*) Forests, 1880-1980", in Grove et al. (eds), *Nature and the Orient* cit., pp. 421-458, p. 437.

⁵³ These "public works" accounted for almost 20 per cent of Britain foreign investments abroad. See John et al. (eds), *Global Business Strategy* cit., p. 18.

demanded by the needs of the country".⁵⁴ The impact of this slowdown of investment in public works can be expected to have damped agricultural expansion. At the same time, the depreciation presumably had an opposite effect on exports and the spatial expansion of crop cultivation. The possibility of such impacts, ambiguous as they may be, is nonetheless important to recognize.

Private business investment in India, though not guaranteed by the government like the railways and public works, may also have been affected by increasing risk from the declining sterling value of accumulated profits due to a depreciating silver rupee. The growth of the cotton, jute and tea industry may therefore have been impeded to some extent by the prevailing currency situation, though at the same time a greater purchasing power of sterling would have meant an incentive to invest in as well as export from India. According to Jevons, it is the latter trend that prevailed. Thanks to the falling rupee, merchant princes of Bombay and Calcutta made large fortunes in the export trade, which were reinvested in cotton and jute mills in India.⁵⁵ Table 2 shows the "growth of these industries as a result of capital invested during the period of falling exchange".⁵⁶

In the case of investment in the tea industry, Rungta points out that even though the price of tea fluctuated a great deal on account of the fluctuations in the exchange rate, particularly around 1890, the flow of investment was determined primarily by the rate of growth of the market. This is substantiated by the Darjeeling and Terai Planters Association's memorandum to the Viceroy of India, which states that "whatever difficulties they meet with in procuring financial assistance from the capitalists in England are ... attributable to over-production of tea, and not to any deterrent effects produced upon English capitalists by the fluctuations in Exchange".⁵⁷ In fact, the steady decline in rupee value may have contributed to

⁵⁴ Ambedkar, *History of Indian Currency* cit., p. 88.

⁵⁵ H. Stanley Jevons, *Money, Banking and Exchange in India*, Superintendent Government Central Press, Simla 1922, p. 128.

⁵⁶ *Ibid.*, p. 128.

⁵⁷ R. Shyam Rungta, *The Rise of Business Corporations in India, 1851-1900*, Cambridge University Press, Cambridge 1970, p. 171.

Table 2. Growth of Cotton and Jute Manufactures between 1878-79 and 1898-99

	1878-79	1898-99	Percentage Increase
Cotton Manufacture			
Number of mills	58	174	200
Number of looms	12,983	37,288	187
Number of spindles	1,436,464	4,463,342	211
Authorised capital*	57.1	150.4	163
Jute Manufacture			
Number of mills	22	33	50
Number of looms	4,946	13,421	172
Number of spindles	70,840	279,482	294
Authorised capital*	26.7	49.3	85

* Sterling share capital in millions of rupees converted at Rs.10 = £1.

Source: Stanley Jevons, *Money, Banking and Exchange in India* cit., p. 128.

the overall growth in overseas demand for Indian tea and have been an incentive to invest in the tea industry.

As regards private investment, the generally accepted view is that “*depreciation facilitated* expansion of small scale commodity production such as wheat, cotton, jute, tea and other primary products and also led to the rise of two factory based industries in India: textiles and jute”.⁵⁸ What concerns us here, however, is the impact of industrial growth on the environment; to estimate it, we must look at the role played by currency depreciation in the growth of agricultural export.

Agricultural Trade and Forests

Perhaps the most direct outcome of a depreciating currency is increased exports. One of the concerns with SAPs was the impact of currency devaluation on increased exports of environmentally sensitive commodities and goods. I pose a similar question here: Did the

⁵⁸ J. McGuire, “India, Britain, Precious Metals and the World Economy: The Role of the State Between 1873 and 1893”, in McGuire et al. (eds), *Evolution of the World Economy* cit., p. 181. Emphasis my own.

rupee depreciation stimulate (investment and) exports of goods and commodities in the late nineteenth century? This impact is important to us because Indian exports predominantly consisted of a range of environmentally sensitive commodities and goods, including timber, bamboo, plantation products such as tea and rubber, agricultural produce such as wheat and sugarcane, and commercial crops such as jute. Table 3 shows the composition of India's export products.

Before answering this question, I must mention that many economists and economic historians of the early twentieth century believed that the depreciation of the rupee *per se* may not have had a significant impact on export. For instance, Vakil and Muranjan argued that the advantage of a depreciating rupee to Indian exporters was only a transient; a benefit accruing to Indian exporters only in the time interval between the depreciation of currency and the proportionate increase in domestic price levels.⁵⁹ Ambedkar too argued that the long-term impact of rupee depreciation was a steep increase in price levels without a corresponding increase in nominal wages. "The conclusion, therefore, is that the falling rupee exchange could not have disturbed established trade relations or displaced the commodities that entered international trade".⁶⁰ The depreciation would thus have benefited Indian producers but left labour worse off, with lower real wages. In spite of the argument that domestic price increases would have nullified the benefits of a fall in the rupee, a continual depreciation of currency could have meant a sustained benefit to exporters, since price adjustments occurred with a time lag. Moreover, in India the habit of hoarding precious metals resulted in the non-monetization of silver into coins, so that price increases may not have been commensurate with the surpluses in the balance of payments. In this regard, Schmidt commented: "Prices in the silver countries have admittedly not risen, and the equilibrium of trade has therefore not been reestablished in the manner which the text books lead us to anticipate. But I even doubt whether conditions such as would produce a rise in prices exist in the silver countries".⁶¹

⁵⁹ Vakil, Muranjan, *Currency and Prices in India* cit., p.42.

⁶⁰ Ambedkar, *History of Indian Currency* cit., p. 105.

⁶¹ H. Schmidt, *The Silver Question in its Social Aspect: An Enquiry into the*

Table 3. Indian exports (percentage share in total export value)

Commodity	1860-1	1870-1	1880-1	1890-1	1900-1
Raw cotton	22.3	35.2	17.8	16.5	9.4
Cotton goods	2.4	2.5	4.2	9.5	9.4
Indigo	5.7	5.8	4.8	3.1	2
Food grains	10.2	8.1	17.1	19.5	13.1
Raw jute	1.2	4.7	5.2	7.6	10.1
Jute goods	1.1	0.6	1.5	2.5	7.3
Hides & skin	2	3.7	5	4.7	10.7
Opium	30.9	19.5	18.2	9.2	8.8
Oilseed	5.4	6.4	8.6	9.3	8.3
Tea	0.5	2.1	4.2	5.5	9

Source: Tomlinson, *The Economy of Modern India* cit., p. 52.

Although it is difficult to pinpoint a specific causal link between rupee depreciation and export growth in the late nineteenth century, there is extensive evidence that India did witness growth in exports in this period. The reasons are many, including “the world trade boom that began in the 1870s and lasted, with some minor interruptions, until 1913...”⁶² accompanied by a “complete revolution in the conditions of trade in the country”,⁶³ which arose from a multitude of factors including the opening of the Suez canal in 1869, the replacing of sailing vessels with steamships, an expanding railway network within India, declining freight rates and the elimination of the middleman. In this changing global macroeconomic environment, “the steady depreciation of silver-based currencies such as rupee against the gold-based currencies of Europe and North America kept Indian export prices competitive in the 1870s, 1880s and early 1890s”.⁶⁴

Existing Depression of Trade, and the Present Position of the Bimetallic Controversy, Effingham Wilson, London 1886, p. 34.

⁶² Tomlinson, *The Economy of Modern India* cit., p. 119.

⁶³ Ellstaetter, *The Indian Silver Currency* cit., p.26.

⁶⁴ Tomlinson, *The Economy of Modern India* cit., p. 53.

Rather than as a positive development, Hyndman perceived this export growth as one which arose from India's desperation for gold to remit its obligated charges to Britain: "Many millions more tons of agricultural produce [had to be exported] in order to make up the amount of the drain for home payments in gold".⁶⁵ This viewpoint is further exemplified by Schmidt who saw a continued pressure for Indian exports to increase in order to receive enough gold to balance the budget of the Indian Government.

India has been developed and protected by English capital for many years past, and for these services she owes a yearly payment to England which, to a very large extent, has to be made on the gold basis. As silver has fallen, the burden of these payments has increased, and India has had to augment her exports to re-establish the balance. The larger offers of her produce resulting from this cause, together with the possibility of obtaining it for less gold, owing to the lower price of silver, brought about the first fall in the prices of the gold countries, which took place in the quotations of the produce of the East. As exchange continued to fall India had to still further increase her exports and, taught by necessity, she began more and more to turn her attention to the cultivation and production of articles which, hitherto, had been chiefly supplied by gold countries, her exports of which would therefore enjoy to the full the benefit of the lower price of silver, i.e., wheat, cotton, hides, etc.⁶⁶

The increased export of goods and commodities from India was not a matter of choice, it was a necessity. Viewed in this way, it is then apparent why the Forest Policy Resolution of 1894 would have favoured agriculture expansion over forest preservation.⁶⁷ Whichever way we choose to look at the possible reasons for export growth, the outcome was unequivocal: Indian commodity exports increased significantly. For instance, "in 1891-5... about 17 per cent of the wheat harvest was exported, as against 8 per cent of the rice harvest".⁶⁸ The export of jute bales from Calcutta almost doubled, from 173,255 in

⁶⁵ H.M. Hyndman, *The Bankruptcy of India: An Enquiry into the Administration of India under the Crown*, Swan Sonnenschein, Lowrey & Co., London 1886, p. 210.

⁶⁶ Schmidt, *The Silver Question* cit., p.10.

⁶⁷ See footnote 37 above.

⁶⁸ Tomlinson, *The Economy of Modern India* cit., p. 61.

1880-81 to about 363,770 in 1894-5.⁶⁹ Tea also “grew spectacularly during the last quarter of the nineteenth century, when tea production increased from 6,000,000 lb in 1872 to 75,000,000 lb in 1900”.⁷⁰ Tea exports, which were a very substantial portion of total production, rose sharply from about 33 million lb in 1877-8 to about 58 million lb in 1882-83.⁷¹ Graph 4 below shows the upward trend in the export of timber (mainly teak) between 1868 and 1904. Since “the great export staples, on which India’s whole trade depends, [were] mainly agricultural”,⁷² these increases in production “exercised a major influence on the rural economy from about 1870 until the late 1920s”.⁷³

The link between agriculture and forests has always been close, though primarily a negative one. As Flint points out, “deforestation, driven by agricultural expansion and aggravated by the extraction of forest biomass at unsustainable levels, has long been recognized as the dominant trend in the history of Indian land use”.⁷⁵ This negative relationship can only have been accentuated during the export boom of the late nineteenth century, in which the production of agricultural commodities witnessed substantial increases. The increased production presumably came from both a temporal expansion, whereby “farmers increased the proportion of arable land which was cropped more than once per year”, and a “spatial expansion; and, of all the land available for such expansion, forest land was the easiest to convert. However, the latter was in no way insignificant; Roy estimates that between 1885 and 1938, cultivable area

⁶⁹ T. Sethia, “The Rise of the Jute Manufacturing Industry in Colonial India: A Global Perspective”, in *Journal of World History*, 7, 1, 1996, p. 79.

⁷⁰ R.P. Behal, “Power Structure, Discipline and Labour in Assam Tea Plantations during Colonial Rule”, in *Coolies, Capital, and Colonialism: Studies in Indian Labour History*, R.P. Behal and M. van der Linden (eds), Cambridge University Press, Cambridge 2007, p. 143.

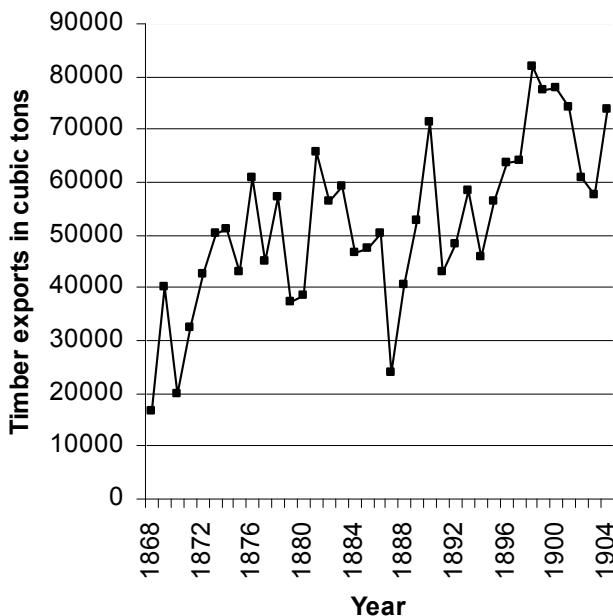
⁷¹ W.W. Hunter, *The Indian Empire: Its People, History and Products*, Asian Educational Services, New Delhi 1905 (reprint 2005).

⁷² H.J. Tozer, *British India and Its Trade*, Harper & Brothers, London 1902, p. 8.

⁷³ Tomlinson, *The Economy of Modern India* cit., p.59.

⁷⁴ E.P. Flint, “Deforestation and Land Use in Northern India with a Focus on Sal (*Shorea robusta*) Forests, 1880-1980” in Grove et al. (eds), *Nature and the Orient* cit., p. 421.

Graph 4. Quantity of timber exported from British India to foreign countries on private account



Source: Based on data compiled from Digital South Asia Library, Statistical Abstracts Relating to British India, 1868-1904, <http://dsal.uchicago.edu/statistics/>

in coastal Madras increased by sixty million acres".⁷⁵ The increase in arable land area was not limited to the subsistence agricultural sector; agricultural clearance for cash crops such as cotton, tea and sugar also destroyed large areas of forest during the colonial period.⁷⁶ Moreover, this commercialization was "driven by trans-local markets. Between 1880 and 1925, the real volume of trade to and from India doubled. The value of export quintupled between 1870 and

⁷⁵ T. Roy, *Rethinking Economic Change in India: Labour and Livelihood*, Routledge, London 2005, p. 35.

⁷⁶ Flint, *Deforestation and Land Use* cit., p. 432.

1914. More than half of Indian exports now consisted of agricultural goods such as grains, seeds, raw cotton and raw jute. The age of the artisan had ended, and the age of the peasant had arrived".⁷⁷ This is also evident from the changing composition of exported products presented in Table 4. The conflict between the civil service and forest officials, with the former gaining the edge, has already been highlighted above. Thus, the conversion of forests to agricultural lands could only have accelerated during this period.

Writing in 1897, Brandis describes how domestic agricultural growth impacted forests during the Indian cotton boom, c. 1860-65, which came about as an effect of the American Civil War and the resulting drop in the supply on the international market. There is no reason to suppose the situation would have been any different with the extensive increases in cotton cultivation in the 1880s.

In certain forest tracts the watershed of the timber trade has entirely changed since the American war has stimulated the export and cultivation of cotton. From the forests of north Canara, the former export of timber was all seawards, and fortunately it was not of great importance, and has not exhausted the forests. The export inland was trifling. Since the American war, however, a considerable demand of timber and bamboos for the cotton producing tracts east of Dharwar has sprung up, and brisk trade is now carried on in that direction. Similar changes in the lines of export have taken place in the Kandeish Dangs, and elsewhere in many places.⁷⁸

Evidence of the impact of expansion of plantations on forests is strong. For instance, Reisz reports of rubber tapping on deforestation; "Indian exports peaked in 1869 and then declined rapidly as the rubber forest retreated under extraction pressure. In 1869, Gustav Mann, Assistant Conservator of Forests in Bengal, claimed rubber tappers would fell trees 'with axes, or, if this was too troublesome, collect firewood and burn them down, so as to render the operation of tapping more convenient than it would have been had

⁷⁷ Roy, *Rethinking Economic Change in India* cit., p.35.

⁷⁸ D. Brandis, *Forestry in India: Origins and Early Developments*, with a foreword by Samar Singh, Natraj Publishers, Dehra Dun 1994 (original 1897), p.30.

⁷⁹ E. Reisz, *Free Trade and the Pursuit of Hegemony: Imperial Britain in Global Rubber Markets, 1860-1922*, <http://www.ehs.org.uk/othercontent/reisz.htm>, p. 3.

Table 4. Approximate area in '000 acres occupied by cotton and wheat

Province	Wheat		Cotton	
	1877-78	1882-83	1877-78	1882-83
Madras	16	27	1,000	1,456
Bombay & Sind	915	1,626	1,420	2,640
Punjab	7,000	6,731	660	860
Central Provinces	3,600	3,619	810	612

Source: Hunter, *The Indian Empire* cit., p. 501.

the trees been left standing' ”.⁷⁹ In his practical guide on tea cultivation, Money describes how planters would have to get rid of the jungle before undertaking a new venture: “In Bengal I do not think the nature of the jungle on land contemplated signifies much. As a rule, the thicker the jungle the richer the soil; but in seeking for a site large trees should not be a *sine qua non*. Much of the coarse grass land is very good, and large trees add enormously to the expense of clearings. It is not cutting them down which is so expensive, it is cutting them up and getting rid of them by burning, or otherwise, after the former is done”.⁸⁰ Hunter graphically describes the process of bringing new land into condition, for which “the jungle should be cut down in December, and burned on the spot in February”.⁸¹ In his study of Ceylon (now Sri Lanka), Meyer too found that “forest destruction intensified (c.1870) with the development of new plantation products such as tea, coconut and rubber … like in India”.⁸² Their need for land for the expansion of production required tea planters to prevent “the state’s Forest Department, their competitor for control of forest lands, from gaining control over wide forest areas”.

⁸⁰ E. Money, *The Cultivation and Manufacture of Tea*, Fourth edition, W.B. Whittingham & Co., Calcutta, 1883, p. 34.

⁸¹ Hunter, *The Indian Empire* cit., p. 508.

⁸² E. Meyer, “Forests, Chena Cultivation, Plantations and the Colonial State in Ceylon 1840-1940”, in Grove et al. (eds) *Nature and the Orient* cit., p. 799.

as".⁸³ Furthermore, and this effect is largely overlooked, many crops, including tea "generate negative environmental impacts because of their indirect effects, for example, during the processing stage after the crops are harvested".⁸⁴ This was all the more true in the nineteenth century during the expansion of tea cultivation in India, when for every 500 acres under tea another 400 was needed for charcoal.⁸⁵ This led to the "wholesale destruction of forests that (took) place in all Tea districts, in order to supply charcoal for Tea".⁸⁶

Money's guide also brings out the sensitivity of British demand to the (sterling) price of tea: "Quotations last year receded step by step, and, as prices dropped, so we found the consumption grew, till for the last quarter of 1882, with its very low range of prices, the average monthly deliveries reached the unprecedented figures of over 5.25 million pounds ... a considerable check was given to deliveries of Indian Teas during the latter part of 1881 and the early part of 1882 through the rise of prices during that period".⁸⁷ Further evidence of the close connection between currency prices and the prices and production of tea can be found in a debate in the British Parliament against the closing of the mint in 1893. A Mr. Burdett-Coutts of Westminster claims that "the tea-planters of Southern India ... want ... a falling rupee ... because, selling their tea in Europe in gold, they get, with a falling rupee, more rupees per sovereign, while at the same time, they do not pay their labourer any more of these depreciated rupees".⁸⁸ A Mr. Wylie reiterates that "exporters from India, the planters, and the British manufacturers in India, who had been making enormous profits by the fall in the exchange, wished

⁸³ R.P. Tucker, "The Depletion of India's Forests under Imperialism: Planters, Foresters, and Peasants in Assam and Kerala", in *The Ends of the Earth: Perspectives on Modern Environmental History*, D. Worster (ed.), Cambridge University Press, Cambridge 1988, p. 124.

⁸⁴ D. Reed, "Conclusions: Short-term Environmental Impacts Of Structural Adjustments Programs" in Reed (ed.), *Structural Adjustment* cit., p. 305.

⁸⁵ Money, *The Cultivation and Manufacture of Tea* cit., p. 2.

⁸⁶ Ibid., p. 121.

⁸⁷ Ibid., pp. 197-198.

⁸⁸ Commons Sitting of 29 March 1898, Orders, Indian Currency, <http://hansard.millbanksystems.com/commons/1898/mar/29/indian-currency>

it to be allowed to decline still further".⁸⁹ Obviously then a steep depreciation in the rupee-sterling exchange rate would have influenced the demand and thereby cultivation of tea. Rungta (1970) also gives an interesting account of how tea companies, which accounted for the largest investment in India after the railways, were responding to the currency situation when "towards the latter part of the nineties many rupee companies were converted into sterling companies, since the depreciation of the rupee gave a higher capitalized value in sterling".⁹⁰ By the last decade of the nineteenth century, when the rupee had "touched its lowest value in terms of sterling and a further fall was very unlikely in view of the currency measures of 1893", and tea exports were booming, investment in the tea industry increased since "sterling could ... buy more of the factors of production whose money cost did not rise".⁹¹ Rungta then goes on to quote something which is of even greater interest to us, namely, the comments of a tea planter:

While the jungle, forest, bamboo, sunn and okra grass are being cut to make room for tea plants, agency houses in London, Glasgow and Calcutta were busy turning land syndicates into gardens, established gardens into companies, and companies into still bigger companies. The bones of the industry were churning with a vengeance.⁹²

The fact that in Assam alone the "area under tea cultivation expanded from 27,000 acres to 204,000 acres" is a clear corroboration of how the macroeconomic environment, with additional support from currency depreciation, was definitively having an impact on the environment.⁹³ Tucker captures the argument I have made thus far, albeit for a period just a few years later:

The impact of World War I on Assam's forest lands centered on wartime prosper-

⁸⁹ Ibid.

⁹⁰ Shyam Rungta, *The Rise of Business Corporations in India* cit., p. 170.

⁹¹ Ibid., p. 172.

⁹² Ibid., p. 172.

⁹³ R.P. Behal, "Power Structure, Discipline and Labour: Assam Tea Plantations during Colonial Rule", in Behal, van der Linden (eds), *Coolies, Capital, and Colonialism* cit., p. 124.

ity and expansion in the tea industry. Prices in Europe rose; acreage under tea in Assam extended rapidly; and dividends to the planters rose correspondingly.⁹⁴

If a depreciating rupee encouraged Indian exports, a countervailing effect was the fluctuations and uncertainty in exchange rates that accompanied the overall downward trend in the rate. Without efficient hedging institutions, there was the danger that returns from speculation could overshadow those from trade, thereby driving out genuine exchange of goods and service between India and other gold currency countries of the world. Ellstaetter narrates how severe the impact on trade could be:

The native merchants of Kurrachee, an exceedingly flourishing seaport at the mouth of the Indus, because the firms engaged in the importation of cotton goods lost heavily in 1890 by the sudden rise of exchange, and the exporters of grain also had lost heavily by the fall in 1891, resolved, as a consequence, in 1892 to buy no more European goods.⁹⁵

The overall impact of currency depreciation on export growth may, however, be considered positive. Based on a regression analysis, Brahmananda found that “except in regard to coffee, the downward trend in exchange rate seems to have had an upward effect upon the quantity of export of every other commodity … for a one percent decrease in exchange rate, the quantity of export went up by about 0.4 percent … ”.⁹⁶ In another important quantitative study, Nugent argued that the exogenous depreciation of silver relative to gold-based currencies benefited the former. Between 1871 and 1899 India, for instance, witnessed “with a single exception … the largest 2-decade increase in real per capita income in its history”.⁹⁷

⁹⁴ R.P. Tucker, “The Depletion of India’s Forests under Imperialism: Planters, Foresters, and Peasants in Assam and Kerala”, in Worster (ed.), *The Ends of the Earth* cit., p. 124.

⁹⁵ K. Ellstaetter, *The Indian Silver Currency* cit., p.23-24.

⁹⁶ P.R. Brahmananda, *Money, Income and Prices in 19th Century India: A Historical, Quantitative and Theoretical Study*, Himalaya Publishing House, Mumbai 2001, p. 481.

⁹⁷ J.B. Nugent, “Exchange-Rate Movements and Economic Development in the Late-Nineteenth Century”, *Journal of Political Economy*, 81, 5.

This investigation shows the various possible, though opposing, linkages between the macroeconomic environment and forests, triggered off by a depreciating and unstable currency. The net effect is no doubt a purely empirical question, which is complicated by other simultaneous macroeconomic events and socio-political changes. The communication and transport revolution of the 1850s and 1860s – which included the inauguration of the Indian telegraph system in 1854, the overland cable connection to Europe in 1868, the opening of the Suez Canal in 1869, and the laying of the sub-marine cable in 1870 – transformed the relationship between central (British) and provincial (India) governments, ultimately allowing a greater degree of financial centralization and control.⁹⁸ These simultaneous events only add to the complexity of my research but do not play down the importance of the exchange rate depreciation on the economy. In fact, Sir Charles Muir even put its importance at a level greater than others.

Wars, famine, and drought have often inflicted losses on the Exchequer far greater than the charge that threatens us in the present year. But such calamities pass away; the loss is limited; and when it has been provided for the finances are again on sure and stable ground. This is not the case with the present cause of anxiety (rupee depreciation). Its immediate effects are serious enough ... but that which adds significance to it is that the end cannot be seen; the future is involved in uncertainty.⁹⁹

Summary and Conclusion

This study has attempted to establish a linkage between two facets of Indian history: financial and environmental. Although these two areas have been the separate focus of contemporary research in the context of structural adjustment programmes, their connection has never been explored so far. More often than not, historians have investigated “real” causes rather than “monetary” ones for deforestation.

⁹⁸ S. Bhattacharya, *The Financial Foundations of the British Raj: Ideas and Interests in the Reconstruction of Indian Public Finance, 1858-1872*, Revised Edition, Orient Longman, New Delhi 2005, p.3.

⁹⁹ Quoted from Ambedkar, *History of Indian Currency* cit., p. 114-115.

tion and forest policy in the nineteenth century. It is quite possible, however, that monetary disturbances could in fact have been the root, or at least a significant, cause in the shifting priorities and policies of India's colonial government.

In my opinion, the environment in Indian history must be seen as part of a whole. The policies and decisions of the Forest Department and its colonial representatives were situated within a macroeconomic context in which personal beliefs and views may have played an important role in shaping outcomes. At the same time, the larger economic context, including the larger global macroeconomic context, certainly exerted pressures on individuals and institutions and led to outcomes that were not always the same as those originally intended. This is evident in recent literature on the impact of SAPs on the environment, where researchers and policymakers have highlighted the close linkages that exist between macroeconomic policy and the environment. There is no reason to believe that these linkages were not as vital in the past, especially in nineteenth century colonial India, whose economy was in many ways more "open" than today, and hence more vulnerable to international financial and monetary disturbances. As we have seen in Table 4 above, in the year 1880-81 just three commodities (raw cotton, food grains and opium) accounted for more than half the total value of exports. The situation in colonial India was thus more akin to that of many present African economies that are dependent on the exportation of relatively few primary commodities, thereby making forests and environment highly vulnerable to macroeconomic disturbances; precisely the economies in which the implementation of SAPs has been regarded as most problematic, at least in so far as its adverse impact on the environment is concerned. Our paper is an attempt to extend this contemporary model of SAP-environment linkages to a different, but not entirely dissimilar context in Indian history.