In Chapter 2, I present a historical analysis of socio-economic factors underlying forest cover change in Upper Brahmaputra Valley. I explore these changes within and across three historical power regimes of the Valley, the pre-colonial (pre-1826), the colonial (1826–1947) and the post-colonial (post-1947) periods, showing how dynamic changes in political economy and demography in each period impacted the forest cover and progressively led to a greater fragmentation of Upper Assam’s forests. Finally, the chapter identifies three key contemporary challenges that must be addressed for a more equitrous and sustainable forest conservation in the Upper Brahmaputra Valley.
Chapter 2

Socio-economic drivers of forest cover change in the Upper Brahmaputra Valley, Assam: a historical perspective*

Abstract

This chapter analyses the historical context of forest cover change in the Upper Brahmaputra Valley of Assam during the pre-colonial, colonial and the post-colonial periods. Our analysis locates these changes within the political economy and demographic milieu of each regime. The pre-colonial period—with its sparse population, agriculture-based economy and regional markets—appear to have had relatively little impact on the Valley’s forest cover. During the colonial period, however, forest cover began to decline against the backdrop of unprecedented population increases and the emergence of new settlements in the Valley. This followed colonial policies and institutions geared to extract and exploit the natural resources of the region, and linked the local economy to the demands of global markets. The post-colonial period, considered by some as extending policies of the colonial regime, continued to see an intensification of natural resource extraction, leading to further shrinkage and degradation of forest cover in the Valley. In the current context—of rising populations linked to immigration from neighbouring regions, of dwindling share of agriculture in the state’s GDP, and recent incentives to small tea growers in risk-prone agricultural landscapes—serious challenges remain to securing forests in the Upper Brahmaputra Valley. I conclude that empowering local communities and institutions, understanding tea plantation dynamics and managing the causes and consequences of recent demographic change are crucial to the conservation of forests in the Upper Brahmaputra Valley.

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2.1 Introduction

India’s northeastern region, counted among the world’s 34 biodiversity hotspots, has remained a biological frontier even well into the twenty-first century. Recent explorations into these forests have continued to yield discoveries of new species and range extensions for many faunal groups (Pawar & Birand, 2001; Datta et al., 2003; Sinha et al., 2005; Athreya, 2006; Das et al., 2006; Mishra et al., 2006). This region’s Upper Brahmaputra Valley harbours wet alluvial grasslands and lowland tropical evergreen forests, regarded among the most threatened forest types in the world. The Valley also encloses, within its folds, a large human landscape of agricultural fields, human settlements, historical towns and one of the world’s largest stretches of tea gardens. As a result, these lowland forests and alluvial grasslands are today broken up by vast tracts of tea plantations and human habitation into isolated fragments that are still very rich in biodiversity. These remnant habitats act as the last refugia for many of the region’s 1,200 bird, 430 mammal, 520 reptile and between 10,000 to 20,000 plant species (Anonymous, 2012). For instance, seven species of wild cats occur in the forests of Jeypore-Dehing alone (Hance, 2010) while threatened floodplain habitats like those of Kaziranga protect several endangered mammals such as tigers and their prey at densities that are amongst the highest anywhere on earth (Ahmed et al., 2010).

Once a vast stretch of contiguous forests, less than a quarter of the Upper Brahmaputra Valley remains under forests today (Forest Survey of India, 2009). These far-reaching ecological changes are the consequence of major historical upheavals in the region’s economy and polity. Indeed, even today, the forests of this region continue to experience widespread fragmentation and rapid degradation. Serious conflicts remain over land and natural resources, raising questions about the future of its forests and their wildlife.

Threats to the forests in this region stem from three broad causal factors. First, although predominantly an agrarian state, Assam’s agricultural economy is in serious transition. In recent years, the share of agriculture—still the mainstay for 53% of the state’s population (Government of Assam, year unknownyear unknown)—in the state’s GDP has declined from 35% in 2000 to 24% in 2010. A lowered per capita agricultural production pushes Assam’s cultivators, especially the most marginal, onto the state’s remaining forests to
mitigate risk in agriculture. The recent expansion of tea, almost exclusively by
small holders (Singh & Ghosal, 2011), is a good example of this threat. Second,
Assam is a state rich in natural resources such as forests, oil, and coal and
natural gas, all vital ingredients in the economic growth not only of the region
but of the entire country. Growing economic opportunities for extractive
industries dependent on natural resources have compounded threats to the
region’s forests, especially in areas that continue to remain relatively pristine,
such as the Jeypore-Dehing forests. Third, in comparison to Bangladesh, Nepal
and other eastern Indian states, Assam continues to offer livelihood
opportunities that are promise relatively better prosperity. As a result, the state
has seen a heavy influx of immigrants, who have increasingly turned to the
remnant natural habitats for cultivation for their livelihoods as well as to meet
their other daily resource needs. Besides adding to social conflict, most of these
settlers have also added to the human footprint on the region’s remaining
forests and grasslands. Thus, the ecology of this region remains strongly
entwined with the state’s political economy.

Any analysis of the prevalent threats to the forests of Assam—which
also hold the key to conserving them—is therefore incomplete without
considering the wider socio-political and economic causes and consequences of
changes in Assam’s natural habitats. Examining the history of forest cover
change in this region, for example, would help us to understand the dynamic
nature of its landscapes and provide a useful frame of reference to assess
contemporary patterns and processes (Swetnam et al., 1999), particularly in the
light of past data and insights. Only such an inquiry into the past can help us
learn how we came to this turn in the road and, perhaps more critically, what
options lie ahead (Rangarajan, 2001).

2.2 Upper Brahmaputra Valley: study area, study period and sources

The Upper Brahmaputra Valley is enclosed by the hills of Nagaland, Karbi
Anglong district of Assam and Arunachal Pradesh. It comprises the erstwhile
undivided district of Sibsagar (current districts of Sibsagar, Golaghat and
Jorhat) and of Lakhimpur (current districts of Dhemaji, Lakhimpur, Dibrugarh
and Tinsukia), and covers an area of over 20 lakh ha. I retain the old district
status, unless stated otherwise, in order to facilitate the comparative analysis
across different historical periods. As our thrust was mostly towards the region
south of the river Brahmaputra, supported also by its well-documented history, the districts north of the river—Lakhimpur and Dhemaji—are not as thoroughly represented in our analysis.

In our analysis, I present the history of the Upper Brahmaputra Valley over three broad periods—pre-colonial, colonial and post-colonial. I define the period from 5th century to the first quarter of 19th century as pre-colonial, dominated largely by the six centuries of Ahom rule until the region’s annexation to the East India Company in 1826. The period under British rule, from 1826 to 1947, has been defined as the colonial period whereas the period after 1947 has been treated as the post-colonial period.

The rationale behind choosing these periods, instead of centuries, was to facilitate a comparative analysis of three distinct political regimes. Transitions between these periods mark a major shift in the political economy, social order as also, rather importantly for our purpose, their ecological fallouts. In this study, I will analyse how broad changes in socio-economic order during these political periods influenced the survival and dynamics of the forest cover of the valley. I also consider these changes against the backdrop of episodic geological events like earthquakes and periodic events such as annual floods that have and continue to work, together with anthropogenic factors, to sculpt this remarkable landscape.

Our study draws heavily on secondary sources, including scholarly articles from peer-reviewed journals, books, old and new working plans and manuals of the Assam Forest Department, travelogues by British travellers, newspaper and magazine articles and the World-wide Web. Interactions and discussion with scholars, historians, social scientists, ecologists and social activists from non-governmental organisations from the regions also greatly enhanced our understanding of this landscape, its history and present-day challenges.

2.3 The pre-colonial period

Although the native vegetation across most of Upper Assam was perhaps forest, alluvial grassland and marsh, the frontier between farmland and forest has shifted considerably over its human history. Pollen of Areca catechu, a domesticated species associated with settled agriculture, for example, was
recovered from a sediment core dating back to 1,000 years BP in the Lekhapani reserve forest of Tinsukia, where no such trees can be found today (Bera & Basumatary, 2008). This thus suggests the historic presence of human settlements in areas that, today, are entirely forested.

The pre-historic accounts of this region are largely based on classical texts such as the Mahabharata, Puranas and the Tantras (Gait, 2005). The history of this region between the 5th and 13th centuries, largely reconstructed on the basis of copper plate inscriptions (Guha, 1984; Lahiri, 1984, 1990), provide clues to the rather sparse human populations in the valley and to land holding by a powerful class of Brahmans. Since the 13th century, the arrival of the Ahom—a Shan tribe of upper Burma—into the valley and their history have been well-documented in their buranjees (historical chronicles). After successfully establishing their kingdom with Garhgaon (presently Sibsagar) as their capital, the Ahom expanded their territories in the valley and, by the year 1700, had conquered regions, earlier included within the kingdom of Kamarupa. In Upper Assam, they expanded their territory by either assimilating the native Moran and Borahi communities of Sadia or by annexing the Chutia and Kachari kingdoms of Dimapur. As a result, the once-scattered and independent political centres of the valley were unified under the single power structure of the Ahom kingdom. Much later, however, a long-term civil conflict—the Moamaria rebellion (1769–1806)—led by the Moran, the adherents of the Moamara Sattra (Assamese Vaishnavite monasteries), weakened their roots and led to the downfall of the kingdom. Subsequent Burmese invasions (1824–26) and eventually the annexation of Assam under British rule, following the Yandaboo treaty with the Burmese in 1826, ended 600 years of Ahom rule in the valley.

The major production system during the pre-Ahom period was shifting cultivation, which made a transition into largely settled agriculture during the Ahom rule when wet rice cultivation was introduced in the valley. There, however, exist ambiguities amongst historians on the major mode of production during this time (Guha, 1984; Lahiri, 1984, 1990). Although the nature of institutions, taxation, regulation and incentive structures of pre-Ahom period are largely rather vague, the inscriptions found during this period established the role of kings and the powerful class of Brahmans in land regulation and taxation. While consolidating their power through territorial expansion, the Ahom also transferred the technology of wet rice cultivation to
other tribes of the valley (Guha, 1966). Agricultural expansion was aggressively promoted and tax incentives offered to open up any forested land for agriculture (Saikia, 2005). With such a mode of production (Gadgil & Guha, 2008), forests, marshes and natural grasslands were soon replaced by cropfields. The main motive of this expansion, however, was to produce surplus yield in order to sustain, besides other non-agricultural populations, a formidable naval infantry—the main agents of state formation under the Ahom.

The Ahom kingdom had complete control over forest resources. Besides opening up the forests for agriculture, collection of items like agar wood and ivory also attracted taxes. There were administrative officers such as Kathkatiya Barua who oversaw the harvest of forest products and Habial Barua who supervised the extraction of forest timber (Handique, 2004). Vast tracts of forests were exploited heavily in order to build numerous boats, important components of naval warfare, particularly between the rivers Dikhow and Dhansiri. This region, located strategically for boat building, lost so much of timber in its adjoining forests that, in 1881, the colonial forest department could barely find quality forest patches in northern and central Sibsagar to create reserve forests (Talukdar & Barua, 2005). In a settled cultivation mode of production, local resources from the forests were used as fuel, fodder, manure, building timber and in implement-making (Gadgil & Guha, 2008). As the population in the valley congregated increasingly in villages and opened up forests for agriculture, it may be speculated that the natural vegetation surrounding settlements were gradually depleted over time. Markets were largely local (Guha, 1983a) although the Ahom had established trade ties with adjoining tribes and indirectly with China and Burma through the Bhutanese and the Singpho (Misra, 2005). The materials traded were restricted to rice, tussar or coarse silk woven by Assamese women, iron and lac, buffalo horns, pearls and coral (Misra, 2005). Markets for forest produce were, however, not well-developed and hence, the forests and their produce could not be fully commodified. The localised market, with limited linkages outside the valley, ensured that the region’s natural resource economy could not yet establish linkages with a wider, external market system.

From the sparsely-populated pre-Ahom period, human populations are likely to have increased during the Ahom period as agricultural societies tend to maintain high population densities (Gadgil & Guha, 2008). During the reign
of the Ahom king Rajeswar Sinha (1751–1769), the population of Assam was 2,400,000 (Guha, 1966). The population of Upper Assam, however, declined from the mid-18th century because of internal conflicts and was reduced by two-thirds during the Burmese invasion in the first quarter of 19th century (Bose, 1993). Much later, in the year 1835, the estimated population of the entire valley was 799,519 and that of the native states of Upper Assam, 220,000 (Gait, 2005). These demographic changes have had significant effects on the forests in the valley. While the population growth during the peak of the Ahom reign decreased forest cover through the process of agricultural expansion and intensification, agriculture was badly affected when populations declined in the aftermath of the Burmese invasion and forests were able to reclaim abandoned agricultural lands (Butler, 1855; Shakespear, 1914).

2.4 The colonial period

Assam was annexed by the British East India Company after the Yandaboo treaty with the Burmese in 1826 while Upper Assam continued under the Ahom kings until 1839. When tea was discovered in Upper Assam in 1823 and successfully produced in 1837, the British sensed an enormous economic opportunity and formally annexed this region too. Many colonial policies favouring European investors were promulgated to encourage tea planters to establish new tea gardens and occupy vast expenses of forested land in the valley. Due to the scarcity of local labour forces to work in these tea gardens, however, indentured labourers were brought from Central India from 1859 onwards (Jha, 1996). This marked the beginning of a demographic watershed in the history of this region. In 1874, Assam was upgraded to a Chief Commissioner’s Province and a provincial forest department established. Subsequently, many forested areas were mapped. Armed with several regulations and taxation laws, the forest department went about its mandate of exploiting forest resources systematically. In the meantime, coal and mineral oil, discovered beneath the forests of Upper Assam during the 1880s, enriched the British crown. In order to transport these commercial materials to tea factories and to remote markets, an extensive network of railways was established along the length of the valley from 1881. These linkages ensured that the region was no longer economically isolated and its natural resources began to service demands from national and global markets. During the first half of the 20th century until Indian independence, Upper Assam witnessed
continuous expansion of tea gardens, increasing human density and escalating conflict over the use of its natural resources. Many forests were brought under the reserve forests network and a few were also denotified, to implement the colonial policy of agricultural expansion through colonisation.

Under the Ahom, the main economic thrust was surplus production to sustain a military-led state formation. However, the colonial period saw the emergence of two distinct variants of the production system, a commerce-driven system based on plantation economy as well as the extraction of natural resources, and another based largely on settled subsistence agriculture. The main motive of both of these production systems, at least in Assam, was to maximise revenue. In the Upper Brahmaputra Valley, commercial plantations were encouraged as its topography and climate were highly conducive for this form of land use while settled agriculture was promoted in the low-lying regions of Central and Lower Assam. The cultivation of tea was promoted through many attractive incentives (Guha, 2006). Two sets of rules pertaining to the tea sector, in particular, are worth mentioning, as they brought about significant changes in the landscape. The first were The Wasteland Rules of 1838, under which areas categorised as wasteland (grassland, marshes and forests) were leased at nominal prices to planters. These terms were further liberalised in 1861 under Lord Canning's fee-simple rules to facilitate further expansion of tea in the valley. To increase revenue through agriculture production, settlement and agriculture policies that encouraged peasants to colonise and transform forested lands into agriculture fields were devised (Saikia, 2005). Of these policies, the Assam Land Revenue Settlement, 1886 and the Assam Forest Regulation of 1891 were particularly important in their effects on the forest cover of the valley. The intensity of such colonisation processes reached new heights after 1928 as several professional grazing reserves were opened up to cultivators from the adjoining areas of eastern Bengal and in this process, large tracts of forests cleared of cover (Saikia, 2005). Tucker (1988) estimated that, between 1930 and 1950, immigrant peasants brought approximately 607,072 ha of forestlands under agricultural operations. The immigrant peasants often settled on forest land as they found it difficult to go through elaborate administrative process of getting agricultural land (Saikia, 2005). Deforestation further accelerated during the 1940s as the provincial government decided to de-reserve forests and distribute them among landless peasants under the war-time Grow More Food campaign in the British colonies. The surplus reserve in all the sub-montane areas and in Sibsagar and
Lakhimpur were thus opened up for the settlement of landless indigenous peasants (Saikia, 2005). An estimated 13,646 ha of land were taken up for cultivation in the district of Nowgong, Lakhimpur and Sibsagar during 1943–44 alone (Saikia, 2005).

Riding on the back of liberal colonial policies, tea planters now attempted to grab more land than they required or could manage (Behal, 2006; Guha, 2006). Although about 283,280 ha of land had been with the tea-planters in Assam during 1870–71, the area under tea was only 22,662 ha or 8% of the total area (Guha, 2006). The industry grew phenomenally during the last quarter of the 19th century with the total land area under the industry doubling and covering around one-seventh of the entire settled area in the Assam plains (Guha, 2006). By the end of 1920, one-fourth of the total acreage settled with planters had come under actual cultivation while, by 1938–1939, the area under tea in Assam (including Assam proper and Sylhet) was 179,137 ha, which steadily increased even further after independence (Figure 2.1). The Assam Tea Company was the sole company in 1858 but, by 1865, as many as sixty-two companies had been registered in India; there were only nine tea gardens in 1853 but this number had reached fifty-one in 1859 (Rungta, 1970). The tea industry of Assam had finally come of age.

Since 1881, many saw mills were established to supply storage chests to the tea industry (Sen, 1995) and, by the end of 1901, fourteen saw mills were functioning in the valley (Guha, 2006). The plywood industry started in the Dibrugarh district of Upper Assam for this same strategic reason. The first plywood factory was established in 1914 and subsequently, the Assam Railways and Trading Company opened their factory in 1924 to supply tea chests, and sleepers to the railways. The forests adjacent to these industries began to disappear to fulfil this prolific need for timber.

In order to transport tea, coal, timber and oil out of the valley, a railway network was established. The first railway was started in 1884 from Dibrugarh to Makum (Anonymous, 1981) but had increased from 114 miles in 1891 to 715 miles by 1903 (Guha, 2006). Each mile of railway required 860 sleepers and the average effective life of each sleeper was calculated between 12 to 14 years (Gadgil & Guha, 2008). To lay 400 miles of railways in the valley would have thus required approximately 344,000 sleepers (Handique, 2004) and most of these sleepers came from forests such as those in Nambor (Saikia, 2008a). The
railway system in Assam thus exerted enormous pressure on the forest resources of the province.

The penetration of the market into the valley and its linkages with global markets meant that, to some degree, the fate of the local economy was linked to the uncertainty of international markets. During World War I, the demand for tea increased in Europe and the existing gardens were expanded or new gardens established, all at the cost of local forests. After the war, however, the global depression of the 1930s hit the tea industry heavily and the demand for tea dropped sharply. In order to reduce production, the planters laid off many plantation workers and most of them moved into adjacent government forestland and in the char (river islands) areas of the river Brahmaputra to begin agriculture in a clumsy imitation of local cultivation, and in their economic desperation, seriously damaged forests even more (Tucker, 1988). The extent of government lands taken up by such labourers for cultivation increased from 45,325 ha in 1906 to 106,028 ha by 1921 (Guha, 2006).

Increased connectivity, employment opportunities and vast fertile lands along the riverine tracts and islands, coupled with the state's policy of colonisation, also began to change the demographic composition of the valley. In 1872, the population densities of Lakhimpur and Sibsagar districts were 47 and 15 persons per square kilometre (Waterfield, 1875), increasing by 46% and 24%, respectively, in 1901 (Risley & Gait, 1903). The rate of population increase can be gauged by the fact that, during 1901–1951, the population growth rate of Assam was second highest in the world (Figure 2.2), exceeded only by that of Brazil (204%; Dass, 1980). Intensive cultivation of tea and agriculture also demanded the input of labour in these production systems. The scarcity of the local human resources, particularly in the tea sector, due to 'unwillingness' of the native populace to work in the tea gardens, however, forced the colonial rulers to bring indentured labourers from central India to work in various tea gardens of the valley. These labourers transformed the demographic composition of the valley and also exerted serious pressures on the forest.

The provincial forest department took over the control of the forested land and curtailed the rights and privileges of the natives and restricted the usage of resources through regulations and taxation. Although established as the state's apparatus to systematically exploit forest resources, the forest department in Assam has also played a significant role in buffering the effect of planters, imported labourers and migrants on the forests of Assam.
Nevertheless, the forest department, being a part of the provincial government, was bound to give priority in land allocation to meet the need of the peasants (Ribbentrop 1889, in Tucker, 1988). It, however, soon realised that, in the long run, such prioritisation would threaten the supply of timber and hence, extensive surveys and mapping exercises of the forests were undertaken to particularly delineate the important sal Shorea robusta forests belts. Most reserved forests were established post-1874 and remarkably, continue to survive even today (Saikia, 2005). During 1925 to 1929, the acreage under the reserve forest increased by 400%, largely in the sal belt area of the states. World War II, however, brought major changes in forest production as demand for timber grew with their use in warfare and for infrastructure. Between 1939 and 1945, therefore, timber production in the reserves more than doubled while fuelwood cutting increased more than thrice (Tucker, 1988).

![Graph](image)

**Figure 2.1** Total area under tea in the Upper Brahmaputra Valley, 1860 to 2007

In conclusion, the drastic change from a quasi-feudal economy to a market economy under the British colonial rule was marked by an unprecedented and unparalleled ecological degradation across the Upper Brahmaputra Valley. Baruah (2001) has observed, for example, that in ‘the late nineteenth century Assam has witnessed nothing short of an economic
revolution accompanied by massive ecological destruction’. However, this economic prosperity did not translate into an overall development of the valley and a century later, the region still remained underdeveloped, a phenomenon which the economic historian Amalendu Guha (1974) aptly termed as ‘a big-push-without-a-take-off.’ The population of the valley began to increase during the late 19th century resulting in escalating conflicts over resources as these were now under the complete control of the British. The large-scale deforestation, which had started in the late nineteenth century, increased in intensity and acquired a new feverish pace in the next century, particularly during the 1940s, when amidst complex politicisation of the land problem in Assam, the provincial government decided to distribute land from the reserved forests to landless peasants (Saikia, 2005).

2.5 The post-colonial period

The land-distribution movement, which started during the early 1940s, continued to grip the region and gained new fervour after 1947. Since then, the issues of escalating conflicts over land and resources have dominated the socio-political narratives of the region. However, the major earthquake of 1950 and the equally devastating floods of 1954 changed the landscape of this region to a great extent. Post-independence, the population of the region rose exponentially in the valley, with migrating people from adjoining regions contributing significantly to its growth. The Assam Movement (1979–85), a mass agitation, was fought on the issues of this sharp rise in the population of migrants, which accompanied serious economic underdevelopment. The agitation culminated in the signing of the Assam Accord in 1985. The year 1979 also marked the emergence of armed civil unrest in the valley that has had an important bearing on its socio-economic and political history as well. The economy of Assam has traditionally remained stagnant and, despite being the largest producer of tea, oil, plywood and forest products, it continues to be a relatively underdeveloped state in India.

There have, however, been several small initiatives that have made attempts to improve the local economy in different parts of the valley. In order to mitigate the risk of agriculture production, for example, a new economic initiative began in Upper Assam during the 1970s and took momentum during the 1990s with a huge increase in small, independent tea growers who
currently contribute one-fourth of the total production of Assamese tea. But such initiatives have also taken their toll on the local forests.

Sensitivity to conservation issues became stronger following our independence from colonial rule. The Wildlife (Protection) Act, 1972 was implemented in Assam in 1977 and conservation concerns began to permeate public discourse. With the 42nd Amendment of the Indian Constitution in 1976, forests came on to the concurrent list, and the Centre assumed key law- and policy-making functions in the forest sector. The Forest (Conservation) Act, 1980 was implemented to restrict dereservation of forests and conversion of forest land for non-forest purposes, which again brought the issue of land rights to the fore. This legislation was followed by an order from the Supreme Court in 1996 whereby a blanket ban on tree-felling was imposed in the entire northeastern region of the country.

The main thrust of independent India was on economic growth and nation building, and hence, agriculture expansion and industrial growth occupied top priority in the agenda of successive central and state governments. Even the National Forest Policy of 1952 clearly asserted that priorities of forest management must be made subordinate to the larger national goal of industrialisation (Guha, 1983b). These development strategies, adopted by the Indian state, are critical in comprehending the forest cover change in Upper Brahmaputra Valley in association with the socio-economic and political issues of the region.

One of the major economic thrusts in Assam, immediately after Independence, was on increased productivity in the agriculture sector. This is reflected in the total outlay allocated to agriculture in successive five-year plans of the state: 23.7%, 26.8% and 17% during the First Plan (1951–1956), Second Plan (1956–1961) and Third Plan (1961–1966), respectively (Sarma, 1966). In Assam, there was greater expansion of activities under the Grow More Food Campaign as a result of attaching the highest priority to agriculture by the state government under the First Five Year Plan, beginning 1950 (Government of Assam year unknown). Assam was, however, beyond the purview of another major agriculture intensification drive—the Green Revolution. There was neither agricultural intensification nor expansion, with a mere 2% increase in the arable land during 1950–1970 (Richards & Hagen, 1987). The resident and immigrant population (from East Pakistan, currently Bangladesh, and other Indian states) increased by 84.4% during the same period, largely driven by the
economic and political factors (Dass, 1980). Consequently, the per capita holding of arable land reduced from 0.299 to 0.165 (Richards & Hagen, 1987) putting tremendous pressure on the land. The net sown area in Lakhimpur and Sibsagar districts increased by 18% and 31% from 1960–1961 to 1996–1997, with a concomitant decrease in forest cover by 11% and 45%, respectively. Sibsagar has also experienced a steep growth rate in urbanisation and industrialisation, with the relatively highest share (about 29%) of its area under the non-agricultural sector (Goswami, 2002).

Industry was another sector that was given priority after Independence, particularly those components that focused on tea, coal and oil. However, the region witnessed an acute economic underdevelopment post-independence, as some subnationalist narratives have argued (Sarma, 1966), due to the continuation of the colonial extractive tradition by the Indian state and Indian capitalists. Moreover, these sectors failed to facilitate the growth of the necessary ancillary industries (Misra, 1980). Although one could expect that the pressure on forest land would not have significantly increased under these circumstances, such an effect, even if present, was masked by the growing population of the region. Coupled with the marked inability of the industrial sector to absorb local, unemployed segments of the population, socio-economic pressures clearly shifted to the land and its resources.

The growth of small tea plantations, mentioned above, exerted immense pressure on the forest cover, which can be gauged by the sharp increase of area under plantations since 1992 (Figure 2.1). The Assam Government promoted the expansion of small tea gardens by opening up patches of forested lands, primarily from unclassed forests, to prospective tea planters (Saikia, 2008b). Small tea growers currently contribute approximately 29% of the total tea production of the state and 14% of that of the country.

The plywood industry that developed in the state also clearly impacted the forests until 1996, when the Supreme Court slapped an order on tree felling in northeastern India. Until then, the industry had heavily exploited the lowland rainforests of Upper Assam. The growth of this industry was rather slow till 1950–1951 but made steady progress subsequently; indeed, it was the fastest-growing industry in the state then (Sen, 1995). The nature of production also changed from during this period. There were thus only two units producing about 1.5 million cubic metres of tea chests while other sophisticated, commercial plywood units were absent in 1950–1951. By 1985–
1986, however, there were 14 units that were producing only 0.55 million cubic metres of tea chests but 38 units that produced 41.2 million cubic metres of commercial plywood (Sen, 1995).

The landscape change in the valley was also significantly affected by the demographic changes and the related socio-political developments that swept the region since Independence. Central amongst these were the issues of the growing populations of landless peasants and migrants in the valley, many strongly affected by the periodic floods and erosion that were a mainstay of the valley. The impact of human emigration into Assam can be assessed by the fact that approximately 1.5 million hectares of natural vegetation (roughly 19% of the state’s area) were converted to croplands and human settlement in just a century, from 1870 to 1970 (Richards & Hagen, 1987). The sustained movement of such migrants over the land and the exploitation of its resources, often with political patronage, has thus profoundly affected the forest cover of the region. In Dibrugarh district of Assam, many forest villages were established under the rehabilitation programme for people affected by floods as well as those affected by the devastating Assam earthquake of 1950 (Sonowal, 1997). This policy resulted in considerable land clearing within the confines of reserved forests (Richards & Hagen, 1987). By the early 1970s, successive state governments had surrendered for cultivation and settlement most of the publicly-owned unoccupied lands not included in the reserve forest system (the ‘unclassed state forest system’; Richards & Hagen 1987). Recurrent natural calamities, particularly those related to annual floods in the Brahmaputra, also led to the proliferation of landless people, thereby aggravating the already enormous pressure on existing forest lands.

Under this backdrop of economic slowdown and rising migrant populations, the region plunged into civil unrest that virtually crippled the region politically and economically. Social unrest can have severe consequences on the forest, as exemplified by western Assam that witnessed large-scale deforestation during 1980s when the region was under civil unrest (Horwich et al., 2010). Many of the forested tracts of the valley also served as ephemeral bases for insurgent groups and this has created problems for the protection and management of many of these tracts. The long-term civil strife in the region, for example, created opportunities for the unscrupulous exploitation of forest resources in areas that were now poorly protected. The inter-state boundary disputes that Assam has had with Arunachal Pradesh and
especially Nagaland has certainly also added its share of problems to the exploitation of forests. During 1972–1999, therefore, the valley areas bordering Nagaland and Arunachal Pradesh were observed to be highly dynamic in terms of forest cover change (Lele & Joshi, 2009), possibly due to conversion of forests to agriculture and human settlements.

![Diagram showing human population density (individuals per km2) for different locations from 1901 to 2001.](image)

**Figure 2.2** Demographic trends in the Upper Brahmaputra Valley, 1901 to 2001

At the same time, the creation of legal and governmental machineries to administer large stretches of forest (Rangarajan, 2001) not only brought the issue of forest conservation to the fore but, at the same time, escalated conflict with the local people including tribal groups, whose rights and privileges over the land were curtailed. The role of the forest department in controlling the impact of these processes on the forestland and to check large-scale degradation of forest resources, under the existing legal framework, have been limited, given the continuous pressure from political regimes to open up forested lands for landless peasants. During the colonial period too, it may be recalled, the department had facilitated the settlement of landless immigrants
in the fringes of reserved forests, although the motive then was to fulfil the regular supply of labour for the exploitation of forest resources.

2.6 Upper Assam forests: current challenges and opportunities

We thus see that, by the end of the twentieth century, considerable forested areas in Upper Assam have either been converted to other land-use forms or have been severely degraded. In spite of a long history of deforestation in the region, however, one-fourth of the area continues to remain forested though highly dynamic in nature (Lele & Joshi, 2009). Moreover, there are encouraging trends in terms of forest cover gain between 1972 and 1999 and the fact that over 60% of forested areas of the state has remained unchanged during the same period (Lele & Joshi, 2009). Although this may, at least in part, reflect limitations of remote sensing techniques in detecting qualitative change in forests, there continue to be pressing challenges to conserve the remaining forests of the region.

The remaining parcels of forested land in the Upper Brahmaputra Valley must be managed efficiently as these are critical for future biodiversity conservation and livelihood issues. Many of the extant reserve forests and protected areas in the valley were established over a century ago indicating that strict protection of these forests may have resulted in their continuous existence in spite of systematic logging, pressures from the tea industry and burgeoning population growth. However, such a protective and, hence, exclusionary approach has led to severe conflict over these resources between the local people who have utilised these resources over centuries and the self-appointed guardians of the forest, represented by the state machinery. It is, therefore, unlikely that such strict protection would help sustain these forests in the long run. It is possibly most pragmatic to set aside as inviolate certain forested tracts which are critical for biodiversity while resources in other areas should perhaps be used sustainably.

The agriculture sector of the state, which has traditionally supported a large population, is in decline. The natural resources of the state have been mined for over a century and its economy continues to be dependent on these resources, but clearly unsustainably in the future. Moreover, this sector supports only a minuscule of the population in terms of employment and
livelihood. This social inequity could have serious repercussions on the state's natural resources, given the presence of a large migrant population which depends on agriculture for its livelihood. A closer inspection of the underdevelopment of the region points towards a phenomenon known as the 'resource curse' or the 'paradox of plenty', where areas rich in non-renewable resources tend to have less economic growth and worse development outcomes than do regions with fewer natural resources (Auty, 1993). Assam seems to be such an example within India, where, in spite of abundant non-renewable resources like oil and coal, the state remains economically underdeveloped.

Economic development of a region is necessary and justifiable not only for the overall development of the region but also to release the pressure on its land with its forests. In Assam, however, the recent support provided by the state government to small tea plantations in the region, although hailed as an important step in alleviating wide-spread unemployment and rural poverty, could accelerate the rate of deforestation in the valley.

That land and its ownership remains a contentious issue in the state is evident from the growing discontent over it in the recent past. In 2002, for example, an eviction drive carried out by the forest department, following the direction of the Supreme Court, had attracted state-wide protests and condemnation from social scientists and human right activists (Gohain, 2006). More recent conflict over forested land in the Rajiv Gandhi (Orang) National Park, initiated by the settling of alleged migrants, and the local peasants' movement for rights over forestland in Tengani, adjacent to Nambor forest, in the Golaghat district (Saikia, 2008a) have exemplified the intensity of emotion and action that these issues raise. If not curtailed, these contests could potentially have serious ecological ramifications as has been seen in similar incidents in this region in the past. In the Sonitpur district of Assam, an unprecedented loss of approximately 23,000 ha of forested land from 1994 to 2001 (Srivastava et al., 2002) starkly exemplifies the possible consequences of such conflicts.

With the implementation of The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 in the state, this debate is likely to become even more serious in the future. The border issue with Nagaland and Arunachal Pradesh has intensified over time and reports of
clear-felling and establishment of settlements in the reserve forests along the border areas are appearing regularly in the media.

2.7 The road ahead

The biggest challenge to biodiversity conservation in Upper Assam is to find ways that can incorporate social justice, and political and economic objectives into conservation planning. I argue that such an approach should be pragmatic and well-planned as decisions resulting from such dialogue would carry greater legitimacy and wider acceptance. I have, therefore, identified three major threads, derived from our historical analyses, that can provide useful insights in understanding the genesis of contemporary issues of forest conservation in Upper Assam and I hope that these observations would be useful in designing effective conservation strategies in the future.

2.7.1 Empowering local institutions

Large centralised institutions such as forest departments may be effective in bringing about change in land/resource use over relatively short time horizons, but sustainability of change is always in question without participation of local stakeholders. Historically, in Upper Assam, people have been excluded from decision-making processes, particularly those concerning access to natural resources under the three broad power regimes studied so far. These resources were either under the jurisdiction of the royalty or an exclusive property of our colonial rulers, and under the control of the state, following Independence. Such an all-pervasive exclusionist policy, unchanging over time, has resulted in accentuated conflicts through the ages leading to severe ecological consequences because when communities are not involved actively in managing their resources, they use them destructively (Sonsel et al., 1996). An attempt was made to decentralise and involve communities under the Joint Forest Management Programme but, so far, the progress has not been encouraging. In a given region, with multiple interests and actors within communities, empowering local institutions rather than communities would constitute ideal mechanisms for resource management (Agrawal & Gibson, 1999). Such a model of natural resource management is likely to effective in Upper Assam if local institutions are empowered against the backdrop of the existence of diverse communities and decentralised institutions such as
autonomous councils (Singh, 2008). Such a move could, however, be challenging in the light of the existing contentious issues of whom to empower: native residents or recent immigrants? It is critical that further immigration into the valley be discouraged and effective mechanisms instituted to empower resident populations who have traditionally relied heavily on the existing natural resources. It should, however, be noted that while executing such processes, marginalisation of the already-present migrants does not lead to the severe retaliatory exploitation of natural resources and escalated conflict over land.

2.7.2 Understanding tea plantation dynamics

Labour and markets are important components of plantation economies and these invariably tend to affect natural resources. Currently, a significant population of tea garden labourers in the valley rely heavily on the forests adjoining their settlements for their daily resource needs. This is particularly accentuated in the case of temporary or retired labourers. Neither the Plantation Labour Act of 1951 nor individual tea estates have been able to guarantee their proper rehabilitation. A proper settlement policy would certainly help in releasing the pressure that this labour force exerts on the adjoining forest resources. The uncertainty in markets usually drives the nature and intensity of production, which, in turn, often translates into a potent force of forest destruction. As local institutions would be unable to check the invasive force of the market economy, the state should play a pro-active role in regulating the functioning of the tea economy in an effort to protect existing habitats in the land-use mosaic of the valley.

2.7.3 Mitigating the effects of demographic pressures

Demographic factors have adversely affected natural resources throughout the colonial and post-colonial history of Assam and continue to be a dominant cause of deforestation in the valley. In a landscape where agriculture production is risky and employment opportunities limited, growing populations will always remain a potent force of destruction. The production systems in a landscape characterised by flood plains provide limited options for agricultural intensification and flood control has always been a formidable task in Assam, given the highly dynamic nature of the Brahmaputra and its tributaries. Promotion of non-extractive industries, those that are not based on the region’s natural resources, will certainly be able to improve the livelihoods
of certain sections of the local population and, at the same time, release pressure on natural resources. Rural development programmes like the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) would be useful such demographic and socio-economic pressures away from threatened natural resources.

Protected areas and inviolate forests are critical for the conservation of regional biodiversity while many of these tracts have historically supported the livelihoods of local human populations. To find ways and mechanisms that conserve our threatened biodiversity but also protect the livelihoods and aspirations of these people so as to make our forests ecologically and socially sustainable is the biggest challenge for the conservation of the last remaining rainforests of the Upper Brahmaputra Valley.
Chapter 2  Historical drivers of forest cover change

2.8 Literature cited


Chapter 2  

Historical drivers of forest cover change

Saikia, A. (2008a) State, peasants and land reclamation: the predicament of forest conservation in Assam, 1850s-1980s. *Indian Economic and Social History Review, 45*, 77.


