



The tea landscape of Assam: Multi-stakeholder insights into sustainable livelihoods under a changing climate

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ABSTRACT

Tea plays a pivotal role in India's national economy, with the state of Assam the world's largest regional producer of black tea. However, various socio-environmental factors are threatening tea production and the livelihoods of millions of people reliant upon the industry. Little documentation exists which provides comprehensive spatial insights into tea production practices and associated livelihoods. Additionally, vulnerability from climate change to those livelihoods dependent upon the tea landscape has received limited multi-level stakeholder qualification. Consequently, this paper goes towards addressing this knowledge deficit through adopting a sustainable livelihoods approach for investigating the tea landscape of Assam. Mixed social survey methods were used to document responses from multiple stakeholder groups representing managers of commercial plantations, smallholders and tea workers. Results provide a comprehensive insight into the livelihoods of those reliant upon tea production activities across the four major tea growing regions of Assam. Outputs indicate that varying production practices are in place to optimise yield, increase livelihood resilience and manage the landscape effectively under a changing climate, with tea workers possessing varying diversity in assets to support their livelihoods. Outcomes from this research highlight the need for adaptable and climate-smart landscape activities, with active support from expert tea advisory agencies, to promote long-term socio-environmental sustainable cultivation of tea under changing climatic conditions.

1. Introduction

India has experienced a rise in the importance of its domestic tea market with overall tea production increasing by 19% between 1997 and 2010 (Arya, 2013). Conversely, international trade has declined since the collapse of the Soviet Union in the 1980s (Lines, 2006) with falling tea auction prices since the 1990s (Mishra et al., 2011) and recent stagnation in productivity (Arya, 2013). Historically, tea has played a vital role in the national economy, providing sectoral employment in remote and poor rural areas (Lines, 2006), yet tea plantation labour wages are the lowest of the organised sector (Mishra et al., 2011). The recent closure of some tea plantations has had a detrimental impact on worker livelihoods given the limited availability of alternative livelihood strategies in the tea growing regions (Van der Wal, 2008).

Assam, a state in northeast India, is the single largest tea growing region in the world, producing approximately 57% of India's tea (Tea

Board of India, 2017) and providing some of the world's finest black tea (FAO, 2016); Assamese tea is registered as a Geographical Indication tagged product signifying the quality and importance of tea produced in this region. Despite the product's importance, there is limited comprehensive empirical evidence regarding the inherent value of the tea landscape for producers and the impact production has on sustaining livelihoods, particularly under a changing climate. Research into likely future climate change projections for northeast India, which predict further increases in temperature and uncertain variation in precipitation (Dash et al., 2012), has been undertaken, but there remains a large tea-climate research deficit for the region which needs addressing, particularly in terms of enhancing evidence-based climate change adaptation of tea landscapes for sustaining livelihoods. This shortfall is echoed by a recent bibliometric review undertaken by Marx et al. (2017) which highlighted the deficit of explicit analyses of global climate warming impacts on tea production landscapes.

To help address this research deficit, this paper presents evidence to

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better understand the determinants of livelihood vulnerability to climate change in the tea landscape of Assam, through comprehensive multi-stakeholder insights into the livelihoods of those dependent on tea production. Such information provides documentation into the processes and strategies within the tea landscape which are crucial for sustaining livelihoods, and how climate change vulnerability is impacting landscape resilience and socio-environmental sustainability. This paper begins by providing a brief overview of tea production in Assam regarding landscape management, livelihood security and regional climate change pressures. To gain a greater understanding of sustainable livelihoods in Assam, multiple stakeholders (plantation managers, smallholders and tea workers) participated in this research to garner information regarding tea landscape activities and the implications of regional climate change. Our research contributes to advancing knowledge for informing tea landscape management to sustain livelihoods under a changing climate. Outcomes highlight the opportunities for advisory agencies to help communicate information around production and climate change mitigation/adaptation strategies more effectively to tea growers, and we identify the need for climate-smart measures to enhance landscape resilience.

2. Landscape management

Tea is indigenous to northeast India and large-scale commercial cultivation in the region contributes over 50% of tea to India's overall production from more than 900 estates (Dikshit and Dikshit, 2014). Approximately 1.2 million workers are employed within the tea sector in Assam (Dikshit and Dikshit, 2014), primarily by large commercial plantations which dominate around 65% of tea production; the remaining 35% is produced by smallholder farmers with cultivable plots less than 10 hectares in size (Mansingh, 2013). The Tea Board of India regulates tea cultivation with regard to tea outputs, quality and marketing (Borah, 2013). Tea producers are somewhat reliant on advice from the Tea Research Association (TRA) who provide necessary guidelines for tea cultivation to tea farmers and estates (Dikshit and Dikshit, 2014), drawing upon information in their *Tea Field Management* guidebook (Goswami, 2011). Guidance is provided on fertiliser and pesticide applications to maximise yield, as well as information on best tea garden practice such as water resources management, crop shading, soil erosion control and reducing land degradation (Goswami, 2011). However, not all tea gardens have access to this advice so land management practices can be variable across the region. The small tea grower sector (smallholders) especially lacks access to this information which not only affects their production, but also presents sustainability challenges due to limited sectoral regulation, less environmentally sustainable farming practices, low traceability, poorer quality crops, and intermittent production which threatens export-orientated supply changes (Van der Wal, 2008). Poor tea production practices can cause adverse environmental impacts through land clearance for cultivating tea crops, high energy demands for crop processing, excessive pesticide application to counteract pest attacks, reduced soil fertility (which increases agrochemical use for soil nutrient fertilisation) and increased occurrence of erosion (Van der Wal, 2008). All producers are under added pressure from increasing climate change susceptibility, but smallholders have a lower capacity to adapt to climate threats (Nair et al., 2013).

3. Livelihood security

The tea sector is labour intensive with cultivation requiring a large workforce to maintain the landscape (Dikshit and Dikshit, 2014). Under the 1951 Labour Plantation Act (PLA), the welfare schemes of tea plantations are obligated to ensure provisions for permanent workers,

such as subsidised rates of rations and tea, medical benefits, housing and land for private farming (Duara and Mallick, 2012; Mansingh, 2013). Casual (temporary) workers are not entitled to these benefits except rations at a nominal rate (Duara and Mallick, 2012). However, those contracted to more than 60 days per year do have entitlements, yet these are rarely enforceable (Mansingh, 2013). Despite the requirements of the PLA, many plantations in Assam fall short of fulfilling these provisions, and even with those that do, pay is often below the living wage, with most labourers classed as extremely poor (Mansingh, 2013; Nayak, 2009). Low wages are a necessity according to plantation managers to ensure tea estates remain profitable (Duara and Mallick, 2012) to offset factors such as falling market prices (Mansingh, 2013) and rising energy costs (Van der Wal, 2008).

For an already highly vulnerable work force, primarily comprised of workers who are poor and often from scheduled tribe and caste and/or migrant communities (Van der Wal, 2008), this presents severe risks to livelihood security (Mishra et al., 2011). In particular, many tea plantation workers and their families have low levels and limited access to education, and high levels of illiteracy (Duara and Mallick, 2012), which limits prospects for livelihood diversification (Mishra et al., 2011). Additional livelihood concerns stem from malnutrition due to inadequate access to basic facilities such as drinking water, sanitation and electricity (Van der Wal, 2008). Plantation work is a gendered space with females employed to pluck tea leaves, and males engaged in maintenance of estates (including pruning), factory work, pesticide application and weed removal (Duara and Mallick, 2012). Although the gender employment split in plantations is roughly equal, women are often in lower paid, irregular and informal employment (Mishra et al., 2011).

Since the 1990s, tea cultivation on smallholdings has increased in Assam with more than 270,000 small tea growers (Dikshit and Dikshit, 2014), the majority (94%) of which are located within the Upper Assam region (Borah, 2013). However, most smallholders are excluded under the PLA (holdings less than five hectares) and growers have limited access to land management information. These circumstances present livelihood challenges, particularly as smallholders have low bargaining power on the supply chain with high dependency on private 'bought leaf factories' (BLF) for selling their tea, and as the market price for tea is set by the auction houses, this places limits on the cash value of Indian tea (Lines, 2006). Low farm gate prices, poor extension services, limited market channels, poor access to credit and low levels of farmer organisation all present problems for smallholders (Van der Wal, 2008). Despite these pitfalls, smallholders have lower costs (they are not required to provide social provisions like plantations for workers) and the production model is seen as more favourable (Van der Wal, 2008). Borah (2013) recommended that smallholdings should be encouraged and supported as entrepreneurial activities as tea enterprises can play a pivotal role in reducing poverty and generating employment. However, several barriers such as land ownership, limited finance, low price of green leaf tea and unorganised cultivations practices are greatly hindering smallholder expansion in India (Borah, 2013).

4. Climate change

Climate change poses a major threat to the socio-environmental resilience of agricultural systems, which includes the tea landscape of Assam, particularly the production of premium tea products (FAO, 2016). Given that tea produced in India equates to approximately a quarter of global tea production, with around 17% exported – primarily consisting of premium products (Tea Board of India, 2017) – the economic foreign exchange earnings of tea are under threat from adverse climate impacts which threaten productivity margins. Temperatures, precipitation variability, and the frequency of extreme weather events

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