Jhum Cultivation among the Eastern Nagas: Changing Land, Labour, and Social Relations in Nagaland

Debojyoti Das *
Department of Anthropology, School of Global Studies, University of Sussex, Falmer, Brighton, United Kingdom
*Correspondence: ukdebodas@gmail.com

ABSTRACT

The paper analyses the dialectics of land and labour relation to assess the multifaceted and changing relationship between nature and culture in jhum development villages. Shifting cultivation, locally known as jhum in Indian northeast, reminds us of an archaic form of farming practised in out-of-the-way upland spaces. Today, this form of farming is fast changing into plantation, agri-business and monoculture because of state, donor, and community-focused bottom-up development programmes. Nevertheless, jhum remains a ‘way of life’ and livelihood option for many remote highland farming communities across the Eastern Himalayas. The paper draws upon my ethnographic study on Naga slash and burn farming and the ways it has changed over time with the introduction of agricultural demonstrators, subsidies, microcredits, plantation crops and Baptist work ethics introduced by the village Church. More fundamentally, it reflects the patronage relations between village chiefs, their subjects (clan members), political go-between, and the state. These interfaces developed over time as colonial administrators and anthropologists established their authority and control over Naga Hills in the late nineteenth century with the help of village intermediaries locally known as dobashis. Labour and land relations have both transmuted from communal–common property resources to ‘private assets’ with different meanings attached to right and control over ‘land’ and ‘labour’.
1. INTRODUCTION

Landscape and cultures before they are nature; constructs of the imagination projected onto wood and water and rock… But once a certain idea of landscape, a myth, a vision, establishes itself in an actual place, it has a peculiar way of muddling categories, of making metaphors more real than their referents; of becoming, in fact, part of the scenery (Simon Schama 1995: 61).

Slash and burn, locally known as *jhum* in northeast India, reminds us of an antiquated form of farming that is practised in out-of-the-way upland ‘zomia’ spaces (Scott, 2011). Today, this form of agriculture is fast adapting into plantation, agri-business and monoculture, which has implications for land use, land relation, and farmers’ kinship networks. The hybridization of slash and burn farming has emerged as a new reality often overlooked in mainstream agrarian change debates. The paper will reflect on emerging patronage relations between village chiefs, their subjects (clan members) and the state. In doing so, it will showcase the dialectics of customary land and labour relation, shifting patronage relations to assess the multifaceted relationship that has evolved in *jhum* development villages.

While the debates on national security and counter insurgency have played a significant role in policy and planning for India’s northeast for the last seven decades, agro-ecological discourses have been silent in public and media debates. The upland *jhum* based agrarian economy has been recognised as backward and non-enterprising. In the last decade, this mindset has changed: donors, NGOs and governments have found value in idealising highland indigenous communities as torchbearers of traditional ecological knowledge (TEK) and conservation stewards (Aiyadurai, 2021; Rosgsensashi et al., 2016; Aier & Changkija, 2003). To cite one example, in Manipur’s Ukhrul district, which borders Nagaland and is home to the Thankkgkul Nagas, chocolate transported from mainland India is blended with *bhut jhalukia* (chilli), pumpkin and other exotic nuts to produce organic chocolate bars, new to India’s neo rich urban elite consumers and is marketed through ‘nested network’ online commodity chain such as Amazon and Flipkart where the consumer can directly buy this grocery bypassing traditional market intermediaries (Van der Ploeg et al., 2012; Karmakar, 2018; Samom, 2021). This is believed to generate good profits for farmers as they can
avert speculative pricing by not relying on traditional market intermediaries. Similarly, eco-tourism has emerged in many Naga villages, such as Khonoma, which is declared as a model Naga village located in Kohima. This is an interesting economic change to understand the political ecology of resource use in upland Naga Hills predominantly dependent on jhum that produces ‘commodity fetish’ and low commoditized crops that are used both for sale and housed consumption and ways it impacts land use and land relation in idealised egalitarian social set-up (Cook, 2004; Yeh & Lama, 2013).

2. STUDY AREA CONTEXT
The study was carried out among 106 households in an eastern Nagaland village that are primarily dependent on slash and burn farming but were growing other commercially high-value crops and timber on an experimental basis promoted by the state Agricultural Department and Nagaland Empowerment of People through Economic Development (NEPED) project. This was done through seed supplies, revolving micro-credits and the creation of village self-help groups and work parties among jhum farmers. On the other hand, the influence of the village Baptist Church had a more transformative change in the village agrarian landscape through the reorganisation of the village labour force based on ‘age-set’ as labour work parties since the 1970s. The Church has also changed farmers' jhum crop choices from millets and job’s tears to rice and French beans—locally known as kholar (a low commoditized crop used both for sale in the neighbouring markets and household consumption). A third set of agrarian relations has traditionally been organised by clan members and households based on kinship and clan networks within khels (village ward/ colony). Community households based on clan affine work in each other’s kitchen garden and jhum plots, particularly growing vegetables and tubers. The communal ownership of land in jhum fields is also interwoven with these emerging labour relations organised primarily by the village Church, clan leaders and village headman. Before the arrival of the missionaries in the later 1950s, the village land and labour relation were arranged around the village headman’s house, who received tributes from their clan members and redistributed jhum fallow land for annual slash and burn.
By the late 1970s, all the village headmen were converted to Christianity. Consequently, the Church emerged as a very important institution in the creation of a new world—Lanso. The Naga tradition of offering a feast to the village, whereby the village chief reaffirmed his prestige and patronage over fellow villagers, has now been reengineered in the form of tithe offered to the village Baptist Church. Every household is obliged to offer 10% of their produce to the village church annually, particularly rice and other food grains such as kholar that the Church followers recognise as proper food grains to be consumed by devout Christians. The popularisation of these crops in the study area also follows the Church and state policy to promote the ‘crop of civilization’ among swidden farmers and the state’s mission to sedentarism through plantations and wet terrace rice cultivation. Each of these emerging labour relations has shaped the political economy of eastern Naga villages that have been missionised to grow rice and abandon the cultivation of crops used for homemade beer (millets and job’s tears—buckwheat).

3. FIELDWORK METHODOLOGY

The methods used in collecting the data were based on everyday observation in the village, key informant interviews, a household survey and, more importantly the use of historical ethnographic methods—oral history narratives and visual anthropology. Besides this, I read the existing literature on land relations and colonial legislation. My fieldwork changed from examining the inner workings of the NEPED team and the project as I moved from the state capital Kohima to a remote village in eastern Nagaland. I lived with jhum farmers in their village home and agricultural field makeshift huts to generate my ethnographic data through participant observation but also traced back to the colonial archives kept in British Library, India Office Record, and in Kohima to connect with communities’ collective memory of the place narrated by village elders who migrated to the study village during its formation in the 1940s, a breakaway new settlement.

4. LITERATURE REVIEW

In the last seven decades, a lot has been written on slash and burn farming, starting with the simple-minded definition given by the Food and Agricultural Organization (FAO)
in 1950 that brand-named swidden farming as ‘bad’, ‘anti-modern’ and ‘dangerous’ for our environment. This was followed by a more nuanced understanding of farming in the highland that came out in the classic works of Boserup and Spences in 1960, based on social and ecological systems within which it was practised. Anthropologist Edmund Leach in his classic ethnography on the Political Systems of Highland Burma outlines two parallel political systems that evolved in upland Burma during the late 19th century, which he called ‘guumlao’ and ‘gunsa’ that was linked with semi-nomadic swidden farming in the hills. Leach acknowledges that the complexity of the system is misread by agricultural scientists and state planners who saw swidden farmers as stateless people who are always on the move.

During the 1960s, scholars like Karl Polanyi and Granovetter wrote about transaction relation and their social embeddedness that demystified populist neo-classical economic belief on agrarian productivity focussed on yield per unit. More recently, revisionist scholars have critiqued scientific claims about the negative impact of swidden by looking at national programmes of territorialization that historically marginalized the forest-dependent swiddeners and separated them from their livelihood. Among the revisionist school, neo-indigenistas argue that swidden farming is sustainable when practised under long cycles of field rotation (Agrawal, 1995). They cite the cultural attributes of swidden that make it impossible to be abandoned altogether, leading to the failure of many jhum improvement schemes of national governments and transnational conservation organisations that deny this reality. Agriculture, as the neo-indigenistas claim, is inherently a cultural practice, and if communities are alienated from it, the process of institutional intervention through new technologies and incentives for improvement will fail. On the other side of the political scale, the radical camp of ‘political ecologists’ base their critique on the economic and political circumscription of swidden populations by national policies that favour big capital and transnational timber cartels (Dove, 1983).

5. DISCUSSION

Considering the points of view and contemporary critiques on jhum, I argue for the ‘cultural ecology of conservation effort’. I will explain through a village-level case study the less understood histories of state territorialization of swidden landscapes,
ideas of modernization brought in by missionaries, changing land use and labour relations and shifting values towards access and rights to land under ‘community ownership’, along with the rhetoric of population implosion in swidden villages. To expand my argument, I would like to highlight Tania Murray Li’s work in highland Sulawesi. She shows how scarcity of communal land has been produced by swidden cultivators themselves through emerging capitalist relations that alienate kin members from their ancestral communal land (Li, 2014). This is the emerging contemporary reality of once egalitarian communal land ownership now under pressure from market triumphalism, privatization and self-interest of community members who are involved in permanent tenure through the plantation and cash crop. In this context, the definition of slash and burn farming, as proposed by the journal Human Ecology (2009), clarifies the changes that have come about in the swidden cultivation landscape in Nagaland, as elsewhere in the upland tropics.

‘Shifting Cultivation’ is defined as a land-use system that employs a natural or improved fallow [in] the cultivation phase of annual crops, sufficiently long to be dominated by woody vegetation and cleared using fire. The staple food is most often upland rice but can be maize [...] secondary crops such as cassava, banana and other annual or perennial crops occur to varying degrees in swidden as do cash crops such as ginger, cardamom, etc.’. (Mertz et al., 2009, pp. 261).

5.1. The Colonial Past and the Post-Independence Present

During the late 19th century, the policies pursued to pacify jhum cultivators in the un-administered parts of the Naga Hills were different from those followed in other parts of British India, where forest administrators declared jhum land as forest reserves (state forest) and outlawed such practice, established forest villages, and developed working plans to regenerate timber through scientific forestry (Rangarajan, 1997; Sivaramakrishnan, 1999; Saikia, 2011). The relationship between the resisting Nagas and the colonial state was established through a unique power relation established through ‘rescue and record’ ethnography, unlike the revenue ethnography of mainland India. The purpose of such ethnographic practice was very clear to the colonizer’s mind; to generate detailed ethnographic and sociological data of the Nagas for effective administration (Lotha, 2007). In this process, the village chiefs and the appointed
headmen became the main link between the government and the village as slowly British punitive raids went on to pacify head takers and slave traders in the un-administered parts of Naga Hills in the early 20th century and extended the territorial control of the British administered villages towards Burma.

In the post-independence period, this policy was pursued to quash Naga resistance for self-determination. However, the state also assertively proposed a rural development programme to win over the loyalty of Naga chiefs and villages. Like in many parts of the Global South, as John Harris (1982, 15) has rightly pointed out, since the 1950s, ‘rural development has emerged as a distinctive field of policy and practice’. In the Naga Hills, this became evident post 1950s when the post-independence Indian government introduced Wet Terrace Rice Cultivation to stem out shifting cultivation in the hills. The idea of rural development was brought in by ideas of progress through modern agricultural practices. Although the state initiated the process of modernising agriculture, the evangelists took this mission more worshipfully, particularly the indigenous Naga Baptist Church Pastors and Deakons who came from advanced areas in the Naga hills (Ao, Angami and Sema villages) by establishing new work ethics, communal labours relations and management of time. Rural development was thus guised in the form of sedentary agriculture through the promotion of wet terrace rice farming, agroforestry and horticulturist based crop husbandry.

5.2. Labour, Land and Agricultural Cycle in Nagaland’s Villages

When I visited Leangkunger village, I was informed that the villagers all held private ownership over the land. My host Zipo explained that he owned 19 plots of land in the village; some even owned more than twenty. While on the other hand, nearly 30% of the villagers were landless (my fieldwork household survey 2008-2009; NEPED 2007, p 110). This was quite in contrast to what was in the past. The land was owned till one could cultivate; once one failed to cultivate his fields, the property again became common property and was free for everyone to lay claim on. The village headmen adjudicated the distribution. However, the means of access and control over land have dramatically changed with the coming of new forms of land use that are redefining tenure rights over land.
The most widespread change that one can see is the growth of private forests, plantation farms and orange, pineapple orchards all around the village and particularly close to the settlements. Also, villagers who no longer live in the village invested in such plots for the future. Correspondingly, in many parts of the village jhum landscape, Long Beans/French beans (kholar) cultivation has revolutionized land tenure by lengthening the jhum cycle and making cultivation year after year possible in the same plot, through relay cropping of maize, soya bean and long beans that has in recent times become farmer’s chief source of household staple food and farm income through the sale of surplus in the local market. The NEPED department staff description of relay cropping of long beans in Leangkunger is worth quoting.

In the first year, significant crops like paddy, maize, job’s-tears, french beans-long beans- (kholar), chillies and other minor crops are grown. In the second year, other cereal crops like maize and millets are grown, followed by french beans and soya beans. French beans are sown in July-August soon after the millets are harvested. It is again sown a second time before the harvest of maize so that the maize stack can be used as support. The first year’s crops are repeated in the third year, except for the replacement of french beans with rice beans. In the fourth year, maize, millets, soya beans and french beans are grown again. In this way, continuous use of legume crops maintains soil fertility, which enables the farmers to cultivate consecutively for four to five years (NEPED 2007, pp. 110).

In the past, long beans were grown in small plots. However, with increasing commercial interest every farmer plans to grow long beans as a low commoditized crop (used both for domestic consumption and sale) (Figure 1). This change in land use triggered by the choice and pattern/method of crop husbandry has created a situation where free land or common land is fast becoming scarce as tenurial rights are getting permanent through changing land use and choice of cropping. Farmers with limited (single plot) or no land must borrow from their neighbours and mostly clan affine in return for labour or cash compensation.
The annual crop calendar of Leangkunger has changed from the past in ways that festivals that were central to Yimchunger sowing and harvest seasons are no longer celebrated through ‘Feast of Merit’ but just ‘word of mouth’. For example, the celebration of the Metaimou festival is now performed on a fixed date as agreed by the state and community elders. This has led to the loss of communal celebration and village feast giving. This also impacts the village social structure as people no longer gather as a community during such festivals but celebrate within the household and with neighbouring clan members, unlike during Christmas and Easter when everybody gathers in the village Church for worship and service and competes with one another by offering rice and kholar to the church. This makes them not only a good Christian but also brings social prestige and honour to families who can display their generosity through Church donations. It has given rise to individualism and the emergence of khel leaders and multiple village patrons who build their trust with the community by working as a go-
between in development projects, political party village volunteers, Church workers, Village Council and Village Development Board members. In the past, the village headman and the first settlers were the most important figures in Yimchunger villages. With the conversion of the village headman and his clan members, who believed in animism, the Church has emerged as the chief moral and, more importantly the agency for the social reproduction of power and authority in the village.

In the past, the cropping season was bound up with the rituals and festivities that had seven important celebrations in a Yimchunger calendar year. It began with the celebration of repairing the *Murung* houses (male dormitory) in January after the winter harvest of *jhum* paddy, maize, soyabean and other crops. The celebration is called *Khianghtsunio*. This was followed by *Tsungkamnoi* or *Ngiotonio* harvest festival in January. It is one of the biggest festivals among the Yimchungers where in the past competitive feasting was practised between *murung* houses, and by the village headman through which they established their prestige and status among villagers as a big man. This was also a festival when old feuds were settled through feasts given to enemy villages. This is followed by the *Kimkhiuhnio* celebrations in February. During this period, swiddeners go hunting and largely rely on smoked meat as the supply of vegetables, roots and tubers are limited during the season. This festival is followed by *Wanthsnio* in April when the millet crop is sown along with maize. Millet is still a very important crop in a farmer’s diet. However, wet rice (terraced) is becoming more popular and a dominant crop.

Next comes the *Metemnoi* festival in August, when the millets are harvested. The festival was traditionally celebrated as a five-day festival after millet harvest. It is a time of forgiveness and reconciliation, a time for remembering the departed, and a time of engagements for young couples. Also, the harvesting of millets and village feasts had an important role in the past, that brought social prestige to the village headman/ chief’s family that is on the decline today because of Baptist Church persuasion for modernization of food habits. *Metemnoi* is also defined as the soul mating festival, and it marks the arrival of new life and the waning of the old. It is not only symbolic and spiritual but is materially connected with the harvesting of millets that was not long ago the chief food crop of the community and had a long shelf life much higher than rice.
and can act as food security for farmers during drought and failed monsoon. By the
middle of August and early September, long beans are sown as relay crops. By August,
the maize is harvested, and on its dead stems, long beans creep to bear fruit.

This is followed by the Tsongrhaknoi festival in September. In the past, this was an
important festival as villagers worshipped their weapons used in hunting and cultivation
(machetes and spears). This was followed by Rakrakpu in December. This is celebrated
as a thanksgiving festival these days. During my fieldwork stay in 2008-2009, my host
urged me to visit the neighbouring village Shiponger to witness the Metemnoi
celebrations. In Leangkunger, it was only celebrated through word of mouth. In the
past, village headmen made merry for five full days, sacrificed pigs and engaged in
competitive feasting in which the whole village participated. These days such
celebrations are considered wasteful by villagers. Farmers explained that instead of
wasting precious wealth on Metemnoi feast they could send their children to school or
invest money in productive assets.

The Government of Nagaland had officially recognized Metonmoi as the most
important harvest festival of the Yimchunger Nagas and had also fixed the date of
celebration, which in the past was celebrated on different dates by individual
Yimchunger villages. This has also become the official strategy to nationalise frontier
space through folklorization of traditional rituals and beliefs. In Yimchunger’s day-to-
day material life, these festivals have little value as they are now ordered to a new
conception of toil and work that links them with the mission calendar and observation
of Sunday as the rest day. In the jhum cycle as presented in Table 1, December is the
most important time of the year when rice is harvested. The village gives tithes to the
Church. Christmas is celebrated with Bible prayers at home, church service, hymns,
picnic, gospel songs and feasting with non-alcoholic drinks to which all Baptist and
Catholic households contribute to their respective church congregation. During
Christmas, people who live outside the village in towns and cities also come back and
have a reunion with their family members. The Christmas celebrations are followed by
New Year and the month of January is the period of rest. Following the introduction to
the village and the description of contemporary swidden farming (crop calendar), in the
next section, I will focus on land relations and how it has been shaped in Naga society.
Table 1: Calendar time, agricultural schedule and festivals among Yimchunger Nagas

<table>
<thead>
<tr>
<th>Months</th>
<th>TRC/Tynymia Nagas (Angami area)</th>
<th>jhum cultivation (conventional/traditional)</th>
<th>WRC and TRC, Shamatur Area</th>
<th>Changes in jhum cultivation crop cycle</th>
<th>Agricultural festivals and rituals associated with jhum among the Yimchungers, Shamatur Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>Tilling of Soil</td>
<td>Slash and burn, clearing of jungle and burning.</td>
<td>No cultivation</td>
<td>Done in the same way. But very limited, new fields are cleared for farming. Farmers continue in their old field. New Year celebration.</td>
<td>Tsungkanmeu - harvest festival. Very important in older days. Till date celebrated. Second most important festival to Metimou</td>
</tr>
<tr>
<td>February</td>
<td>Continues</td>
<td>The same continues, before the first pre-monsoon showers set in. Construction of huts in the field</td>
<td>No cultivation</td>
<td>Not much change. Maize seeds are planted in late February</td>
<td>Khiangmeu - sowing of the first seeds festival. No longer celebrated. Only announced through word of mouth, announced in the village</td>
</tr>
<tr>
<td>March</td>
<td>Preparation of transplantation beds</td>
<td>Preparation of field and planting of tubers. Millet seeds are sown along with maize in late march. Mixed cropping, tubers are planted, some vegetables in kitchen gardens, calocassia</td>
<td>Weed clearing</td>
<td>More maize is grown these days than any other crop. Monocropping dominates</td>
<td>Yunthsneu - related to sowing of jhum paddy and building of farm huts. No longer celebrated. Only announced through word of mouth these days</td>
</tr>
<tr>
<td>April</td>
<td>Sowing of Seeds on nurseries</td>
<td>Sowing of jhum rice in freshly cleared jhum land</td>
<td>Continues</td>
<td>Done in few fields. Depends on soil fertility. Some farmers prefer cash crops. Easter celebration</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>Repairing of irrigation channels</td>
<td>Weeding of paddy and millets crops</td>
<td>Preparation of plots, ploughing and furrowing of fields, development of nurseries</td>
<td>More intensive management of fields takes place these days</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>Transplantation of seedlings in terrace plots</td>
<td>This continues</td>
<td>June end: transplantation of seeds</td>
<td>The same is followed</td>
<td></td>
</tr>
<tr>
<td>Months</td>
<td>TRC/Tynyimia Nagas (Angami area)</td>
<td>Jhum cultivation (conventional/ traditional)</td>
<td>WRC and TRC, Shamatur Area</td>
<td>Changes in Jhum cultivation crop cycle</td>
<td>Agricultural festivals and rituals associated with jhum among the Yimchungers, Shamatur Area</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>---------------------</td>
<td>---------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>July</td>
<td>Same continues</td>
<td>Millets crop harvest</td>
<td>Plants are left to grow and maintenance of channels</td>
<td>Millets crop is harvested. Though these days maize is more harvested</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>Weeding and maintenance of field</td>
<td>Harvest of the maize crop starts. Plantation of Long Beans (Kholar), Soyabean (Akhuni), Naga Dal begins</td>
<td>Some weeding</td>
<td>Plantation of long beans is extensive in corn fields</td>
<td>Metimu - harvest related but more to do with birth and death in the society. It is a soul mating festival. State recognized festival, celebrated every year on 16th August. Some young generation people claim it to be the most important festival of the Yimchungers</td>
</tr>
<tr>
<td>September</td>
<td>Farmers see their paddy growing</td>
<td>Taking care of plantation</td>
<td>Farmers take care of plantation and irrigation</td>
<td>Plantations are taken care of weeding</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>Continues</td>
<td>The same continues</td>
<td>Continues</td>
<td>Continues</td>
<td>Tsungseneu - Celebration related to purification and worship of weapons used in warfare. These days rarely known among the Yumchungers, only celebrated through word of mouth</td>
</tr>
<tr>
<td>November</td>
<td>Harvesting season</td>
<td>Harvesting of kholar, Naga dal, soya bean</td>
<td>Harvesting season</td>
<td>Harvesting season of long beans, Naga dal and soyabean crop</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>No farming - lean season. Harvesting continues</td>
<td>Period of recess, harvesting ends</td>
<td>No farming-lean season, harvesting ends</td>
<td>Harvesting continues of rice. Christmas celebration</td>
<td></td>
</tr>
</tbody>
</table>

(TRC= Terrace rice cultivation; WRC= Wet rice cultivation)
5.3. Changing Land Relations

When I first raised the question of property relations with my host, he replied that land was individually owned as private property by households. Community land did not exist anymore. This response came as a surprise to me. A large amount of literature I had read (Mills, 1926; Hutton, 1921; Fürer-Haimendorf, 1939) on Naga land tenure classified it into several categories in which individual ownership or permanent entitlement to land had a very limited share. My sense of the order of things was further destabilised by government statistics for 1984–85 that showed 88% of land holdings in Nagaland as individually owned – although much of this private landholding is classified as held in the name of the community, while an insignificant proportion was identified as individually owned.¹ This section can be seen as an attempt to make sense of this confusing picture. How could communal land be identified as ‘private’ in government statistics? – by contrast to state-owned land, I guessed. But what did my host mean by saying that community land ‘did not exist anymore’ when the statistics stated that nearly 88% of the land was held ‘in the name of the community’? And why, if individual private landholding was ‘insignificant’, was Leangkunger, according to my host, mostly ‘individually owned as private property by households’?

Disentangling these questions involves engaging with some widely debated issues concerning the nature of land tenure and property, especially in relation to systems that give legal recognition to ‘customary rights’, as is the case in Nagaland juridification.

Two (overlapping) areas of general debate are invoked here. First, there are wide-ranging debates about colonial and post-colonial regimes that have ‘recognised’ customary law and/or customary land tenure or customary practices more generally. Many of these debates are focused on Africa. There is a notable lack of literature relating to the Northeast of India, apart from a few new publications that have started reflecting on the complex land question, social customs and its embeddedness in gender roles and emerging rural markets (Fernandes & Barbora, 2009; Maaker & Tula, 2020; Maaker, 2022; Wounters, 2020). Of particular relevance here are the ways these debates

about the legal recognition of customary practices have highlighted a pair of themes that, at first sight, seem to pull in opposite directions: on the one hand, focusing on the ‘myth’ of communal ownership and, on the other hand, identifying the ways that British imperial/colonial classifications imposed ‘alien’ legal categories onto an indigenous system of landholding and land use, specifically, legal categories that implicitly and explicitly categorize property as generically a matter of ‘private and individual ownership’. Thus ‘communal ownership’ is, on the one hand, miscast as ‘ownership’ (in the Western sense of property rights) and, on the other hand, romanticised (as other) in terms of group ownership, an idea reinforced by the egalitarian Naga society.

The second repertoire of broader debates invoked here have in common the fact that, in one way or another, they offer conceptual challenges to legal categorisations of land in terms of property, ownership and exclusive possession/control etc., also embedded in social relations. This second repertoire of debates also sheds light on ‘what happened next’, to put it simplistically. For, once institutionalised, these justified ‘customary’ practices and relations, in a sense, took on a life of their own; once ‘unleashed’, they were utilised in power struggles and reconceptualised in different economic and political situations. This has also been explained in recent writings by other ethnographers working on slash and burn farming in the northeastern parts of India, such as Erik de Maaker, who has worked among the Garos of Meghalaya and has come up with a similar explanation where communal land has been privatised by community members (Maaker, 2022).

As mutated through colonial understandings and legislation (continued after independence and in the post-colonial period), it continues to have effects. Today many ‘participatory’ development programmes revolve around the idea of ‘communally’ owned land or communally shared resources. Land relations cannot be reduced to crude legal property relations. Land use entails social relations of exchange and power that, in turn, cannot be separated from labour, both the organisation of labour and the embedding of labour in social relations. Land relations have also to be understood in the context of changing political, economic and social fields of power. People use the land for many purposes: not just to produce the material condition of survival and enrichment but also to gain control over others and to define personal and social identities (Maaker & Tula, 2020).
In the following section, we will see how contemporary land relations, both institutionalized and reworked traditional power relations that were once monopolized by the first settlers or village headmen (*malik*) who controlled both labour and land. In the Naga Hills, the legal inscriptions of customary practices were a fundamental part of indirect rule. The building up of colonial regulation over land tenure in the name of local customs opened the possibility of multiple, overlapping, and private set of rights of access and control over land and, as a corollary, struggle over the meaning of those social relations (kin, community, clan) that regulated access to land.

5.4. Understanding ‘Communal’ Land

Property and land relations are notoriously hard to define. In so-called private property regimes, owning land in the form of property is itself merely one type of land tenure – the right to hold land and any conditions attached – and both are distinct from user’s rights, the right to use land, which may or may not be based on ownership or land tenure (Bruce, 1998). Colonial and postcolonial understandings of the land systems of the colonized are notoriously problematic, either misreading them in private property categories or casting them as ‘other’, or both. These problems were played out in the debate between ‘formalist’ and ‘substantivists’ within anthropological discourse. On the other hand, the understanding gained in studying non-private property systems has been brought back to challenge and conceptualise western conceptions of their own legal systems. To this effect, the legal anthropologist Hoebel made a very significant remark on land as property:

> The essential nature of property is to be found in social relations rather than in any inherent attributes of the object that we call property. Property, in other words, is not a thing, but a network of social relations that governs the conduct of people with respect to the use and disposition of things (1966, pp. 424).

---

2 The debate between the formalist and the substantive schools was triggered by Herskovits 1940 edition *Economic Anthropology*. The formalist basically argued that all economies could be analyzed using the modern economists’ toolkit, founded on the assumption of scarcity and ration utility. While the substantivist followers of Karl Polanyi argued that pre-capitalist economies were embedded in social and political context, and could only be analyses within their own, quite distinct set of tools- reciprocity and redistribution were put forward as alternative principles of societal integration.
This kind of challenge has been pursued by writers who explore social relations constituting and surrounding land relations more widely and by those who approach land through questions of access and control (which also entails examining social relations). Of central concern in this section is the understanding of ‘communal land’ (and variations such as ‘communal land tenure’). The misunderstanding associated with this concept has been raised in several ex-colonial contexts. For instance, writing on Africa, Cousins notes: ‘The term “communal tenure” as used in the African context has been contentious because it seems to imply joint or collective ownership and use of all land and natural resources (Cousins, 2009, pp. 2, emphasis added). This image of collective ownership and use is seen as ‘other’ to western, especially ‘modern’, legal institutions of property, which is equated with individual private property. ‘Communal and private property regimes are seen as fundamentally different in character and mutually exclusive’ (Berry, 1993, pp. 41). Communal land relations are invariably equated with primitivism, sometimes romanticised as an ‘idealized commons’ premised in sharing and altruism, untainted by materialistic individualism – the milieu of the noble savage or a type of primitive communism – sometimes denigrated as indicating a low level of social organization, savagery and statelessness. Thus, equated with the primitive, the term ‘communal’ tends to be used interchangeably with ‘customary’ and ‘traditional’ (Cousins, 2009, pp. 2, citing Walker, 2004, pp.5).

Yet, at the same time, communal land is often mistakenly taken in the ‘Western’ sense to mean exclusive possession but by a joint subject (the community). Similarly, other specific relationships were miscast. When the empire was entering the final phase of its administration over India, C.K. Meek noted that ‘a frequent source of error had been the presupposition that native conceptions of ownership must be basically the same as those of Europeans. English terms such as ‘rent’ or ‘lease’ have been employed to denote practices that bear only a superficial resemblance to those denoted by these terms. The gift given to chiefs and administrators of land has been assumed to be ‘rent’ and the ‘chiefs’ to be landlords’ (Meek, 1949, pp. 11).

The image of communal ‘ownership’ is widely established as a myth of jhum land relations not only in the Naga Hills but elsewhere. The idea of ‘communal land ownership’ has been established in the past five decades by literature produced by
scholars like Spencer (1966), Boserup (1965), and Conklin (1957) that has reinforced the myth of communal ownership in swidden farms, and is thus very unhelpful in understanding the dynamics of land-use change in contemporary slash and burn society. For example, in his celebrated work on Shifting Cultivation in Southeastern Asia (1966), Spencer produces three models (generalizations) of swidden communities. Local scholars (such as Ayer, 2003) have picked up these models in Nagaland to understand land use in Naga society.

In the Indonesian context, Michael Dove’s study of Indonesian swidden farmers identifies both the myth and its errors. Thus, he attacks the ‘myth’ that:

\[\text{swidden agriculturalists own their land communally (or not at all), work it communally, and consume its yields communally. The truth is that their land (including land under secondary forest fallow) is typically owned by individual households, it is worked by individual household labour force and/or by reciprocal but not communal work groups, and its yields are owned and consumed privately and individually by each household}^*\] (Dove, 1983, pp. 85).

Drawing together these characterizations of the myth: an entity called ‘the community’ is involved in (i) joint or collective ownership of (all) land; (ii) joint or collective use of (all) land, which can be equated with the idea of communal labour; (iii) joint ownership (and perhaps consumption) of the yields/products. Further, ‘land’ may be extended to include natural resources.

In countering this image, there is not a single universal counter-picture; indeed, there is much emphasis on the variability of land relations in colonial settings, swidden and non-swidden. Nonetheless, specific general themes can be identified. Broadly under attack is the idea that communal and individual landholding are mutually exclusive regimes, entailing such entirely disparate mentalities and behaviours that either they could not coexist or would involve two altogether separate modalities. Hence, Berry commenting on the African context, observes:

\[\text{Much of the literature on the nature of African property rights and their implications for economic development postulates a universal dichotomy between individual and communal rights, and then deduces behaviours from}\]

Vantage: Journal of Thematic Analysis, 2022; 3(1): 54-83
the supposed logic of whichever system appears, from available evidence, to have gained the upper hand in a particular colonial context...In fact, individual and community rights frequently coexisted ... (Berry, 1993, pp.41)

Indeed, in the first half of the 20th century Naga Hills, there were both individually owned and ‘communal land’. Equally, it is often believed that communal land was, by definition, non-alienable. Yet, even in the early 20th century, lands controlled by the ‘first settlers’ were sold and bought within the study village and community, although not outside.

More generally, this dichotomy between private and communal land conceals the multiplicity of relationships and types of landholding. As Berry puts it (continuing from above):

“... more than one community might claim rights to a particular resource. Structures of access to productive resources involved “bundles of rights” (Gluckman, 1963) and bundles of shareholders. The way in which a particular resource was managed depended on relations among right-holders as well as on the jural content of the rights they held”. (Berry, 1993, pp.41)

In this light, consider Alemchiba’s account of Naga landholding. Noting that, following colonial classifications, the land is distinguished as communally owned and private/individual owned, he describes individual land as:

*Individual land: in all villages individuals have land rights either inherited or acquired. The individuals have absolute rights over their land. He has the right to share the produce of his land, to transfer holding, to alienate, and to grant the right to use to others. In the case of chieftainship society, a good portion of the land belongs to the chiefs. (Alemchiba, 1970, emphasis added)*

While this is an entirely private-property set of rights, it is important to note who the primary holders of private property are. In fact, not stated here as a ‘property’ relation, the chief also had the power to command labour to work on his private land. In other

---

3 Clearly it is impossible to capture a pure ‘pre-colonial’ period.
4 ‘First settlers’ will be described below.
words, a labour relationship thought to belong to communal land attaches to individually owned land by chiefs.

Describing ‘communal ownership’, Alemchiba notes three different types, based on clan, village and lineage, respectively. Describing lineage land:

Lineage land: there are certain lands in the village owned by a clan group, which neither can be termed as clan land nor as an individual. The right to use the land is covered by the use as in the case of clan land, but this does not form a part of the land of the clan. Gradually most of the land is coming under this category.\(^5\) (Alemchiba, 1970: as cited in Channa, 1992)

Evidently, there is a multiplicity of different types of land-based ‘communal’ relations. The right to use land and ‘ownership’ of land is clearly different. Finally, taken together with the first point, it is evident that the idea of ‘the community’ as a single entity is extremely simplistic. How does this equate to the chief, the village, the clan, the lineage?

While it is correct that control over and access to labour is strongly connected with land, there is a conflation between communal labour and reciprocal labour. The model of communal land strips away other important social relations associated with land and determining land use, notably religion. Let me now turn on to the case study of the village I studied to understand changing land tenure and power relations.

5.5. The Great Transformation: Land Relations in Leangkunger Village

Leangkunger village was founded in the 1940s by a group of surrounding villagers,\(^6\) who thus became the ‘first settlers’. The incoming settlers had to offer mithun, chicken and pigs to Siphonger, Shamatur and Shangpur villages in order to establish the new village.\(^7\) Having paid the mithun, chicken and pigs, they claimed the right of access to

\(^5\) The significance of this remark, in the context of the 1970s, when Alemchiba is writing will be seen later in the chapter.

\(^6\) Leangkunger was referred to as the ‘collection village’ because it had households who had migrated from 17 different villages. The reasons for forming the new village were not clear from villagers’ description. Some explained it as a result of clan conflict while others attributed it to the outbreak of pandemic in the original village.

\(^7\) As the village was formed carved out of land taken from these villages (Siphonger, Shamatur and Shangpurr) the clan members who set out to open up this new village had to pay gifts to the village heads of the villages who gave land.
the land resources and the right to be the owners of the newly founded village itself. The first settlers thus became the *maalik* (custodians) of the village.

The *gaon burah* (village headmen) were guided by the *Khiungphu,*[^8] who had the customary right to first clear the *jhum* plots and observe *genna* (rituals) (taboo), after which people could begin cultivation. These *gennas* were important as they were believed to bring fertility to the soil. The agricultural cycle revolved around the time reckoning set by the *Khiungphu,* who determined the sowing, harvesting and observation of rest days that were central to farm productivity. Labour was organized around communal household sharing. Families were grouped by *khel* under the leadership of the *gaon burahs,* who distributed land to each family. In the *jhum* fields, the *gaon burahs* received the maximum amount of farm labour as they were the managers of agricultural production. The *Khiungphu* received small tributes for making the sacrifice with its powers to fertilise the crops and his blessings for a good harvest.

Among the new settlers in the village, Nikon’s family was the first to accept the Baptist faith as the *Jangru* chief who gave shelter to his father was the first convert in the village and served as pastor in the village for several years.

Initially, the village had seven headmen, and, over time, this number increased as more and more people settled in the village. The later *gaon burah* were politically appointed. They are nominated by lineage groups who had settled in the village and, according to the villagers, had become notoriously disobedient to their *khel* head. In order to control the dissenting voices, the appointment of a new *gaon burah* is the only remedy.

In the olden days, the land was not in short supply, although labour was a limiting factor for successful cropping. The chiefs were the most successful cultivators as they could mobilize the village household labour force to produce the surplus that was necessary to hold the large feast held annually after the harvest of millets and job’s tears, which maintained his status among kinsmen. These relations were soon to take a new turn.

Farming until this time had been restricted to millets and job’s tears as staple food crops of the Yimchunger, along with vegetables and different varieties of tubers, which were

[^8]: Yimchunger priest who had the first right to sanctify the field before each cropping season - first settler.
cultivated in farmer’s jhum plots and back gardens. Household food consumption of the farmers was not rice but was heavily dependent on job’s tears (buckwheat) and millets.

The practice of rice consumption owed much to the missionaries who came from the neighbouring Ao and Sema areas in the 1950s. Rice was also promoted by political go-betweens such as the Regional Council Members in the late 1960s as they became the elected representatives and dobashis, who lived in towns and travelled to neighbouring district headquarters from where they brought the new ideas of cultivation. The consumption of job’s tears and millets slowly came to be ridiculed despite years of resistance. However, by the 1970s, the Church had not firmly established its hold over the village. Then, after two decades of proselytising mission work, in 1972, the village church was constructed. There were few pagans left in the village. Along with the new faith, new labour relations were successfully instilled in the hearts and minds of the villagers, and this was how terrace rice farming came to the village on a large scale.

During this period (starting in 1960), the government, through the Agricultural Department, also promoted schemes for rice intensification to create an alternative settled livelihood for farmers through the central Integrated Wasteland Development Programme. The rice intensification programme had begun under the Northeast Frontier Area (NEFA) administration soon after India’s independence. It aimed to replace jhum cultivation with settled farming. The initial beneficiaries of the programme were the dobashis, village headmen and lower rank government officials who were connected to the villages and acted as benefactors of these programmes and other people who were informants to the government.

In one of my interviews, the head gaon burah of Shamatur town recollected that he had been one of the early beneficiaries of one such government programme in the 1960s. He had started terrace fields after being trained by the Village Level Workers (VLW) deputed by the Agricultural Department to provide instruction on the art of preparing terrace paddy. The village headmen granted these plots of land but were far away from the town and difficult to cultivate. In the absence of freely available labour, they were only taken up by farmers who could pay in cash or kind for large farm labour required during the sowing and harvesting season. Household work parties were not sufficient for such a collective operation.
The present head *gaon burha* observed that in the early 1960s, very few people like him took interest in the cultivation of rice paddy. Terrace plots were small, and there was no incentive for rice cultivation. Labour reciprocity was based on the cultivation of job’s tears and millets, which were not only the preferred crop for household consumption but were used during feasts to brew homemade tipple as drinks. Rice had little ceremonial use and formed a very small part of people’s diet. The key obstacle to paddy farming was the labour ‘shortage’ – not in absolute terms but relative to the labour-intensive nature of wet paddy cultivation.

It was only in the post-1970s, when the village labour force was organized in ‘age sets’ by the village citizen body, rice cultivation started to pick up pace through the grouping of villages in terms of ‘age sets’ or age groups. In the 1970s, during the construction of the church building, the labour relations in the village were reorganised. The village was divided into age groups organised by the Church to generate cash by engaging free man days through a public works programme. When the Church construction was completed, the institution of *thulan thulan* (age group) that was borrowed from Ao Naga areas was set in place. The *thulan thulan* is now engaged in earning wages for the Church from government-sponsored public work programme and by contributing labour during rice sowing and harvesting season. The intensive care that paddy requires during its sowing season meant a dedicated labour supply which was made possible by the ‘age groups’ that gave fixed annual free labour to the church by working in groups on paddy farms. The paddy fields proliferated, and with it, the right to permanent tenure was also established in the lowlands, that were earlier uncultivated and remained fallow, as thick jungles and swampy lowlands, unsuitable for *jhum* cultivation.

Government subsidies, a flood control programme initiated by the engineering branch of the Agricultural Department since the 1970s and the development of minor irrigation channels helped farmers who could secure subsidies from the government to claim these lands from the village council to secure permanent tenure by growing rice, season after season. Interestingly, the first land developers of these wastelands (as they were not suitable for *jhum*) were the village headmen, political go-betweens and low ranked government servants who became the beneficiaries of Agriculture Department terrace rice development programmes.
On the other hand, in the jhum fields, the right to ownership remained communal until plantation farming started in the early 1980s. The role of the khiungphu, who inherited the right to bring fertility to the soil, declined and was completely given up as the Khiungphuship was declared ‘Satan’ by the Church followers. As the whole village slowly adopted Christianity, the practice of offering millets and job’s tears to the Khiungphu as gifts in return for his service completely stopped. Similarly, the 1970s also saw the proliferation of government-supplied guns for village defence, cash incentives in the form of subsidies and people’s demand for education and their desire for public employment brought in the circulation of currency in the form of subsidies, loans, election campaigns funding and wage employment from public works.

Land relations were, till then, based on the village’s first settlers being the custodian of land ownership. But the first owners had also offered land to the new settlers on the promise that they would help supply labour to the Chief’s/ headman’s house. Over time the relationship between the first settlers and the newcomers started to change. This was due to the coming of the church, the birth of a new village polity based on government recognized village council, and later the Village Development Board (VDB) constituted in the 1980s. These institutions were built on Naga customs and traditions to decentralise development intervention in the village and have played a vital role in shaping values over land and property.

The evolving land relations in Naga villages must be understood, keeping in mind the changing socio, political and economic transactions that have shaped clan and community relations. The clans that formed the first settlers in the village have the largest landholding. Many late settlers who originally resided in the lower khel of the village with the first settlers (malik or landowners) have now moved to the upper khel (a khel that has expanded over the years). Influential second settlers among this khel have added private land by buying it from the landowning first settlers. The new settlers or latecomers in the village originally owned a few plots of land as part of the deal with the village headmen, who agreed to give them jhum land for cultivation in return for labour that sustained communal land ownership. Household labour organized in village work parties was central towards jhum cultivation.
Over time this relationship has been altered with the flow of cash and patronage built by new settlers with their fellow village members. Even today, labour relations have not been completely monetized through wages or kind payments in the village. Families and lineage members collectively go to perform agricultural work in the jhum field to grow sweet potatoes, chillies or other kitchen garden crops; all crops except the sowing of rice that requires large numbers of paid hands. This paid labour is offered by Church-collectivized wage groups, voluntary work parties and the Citizen Wage Group that involves all villagers. Without Church organised wage groups, rice farming was not possible in the past. These new developments had created an ideal condition in which beneficiaries of the government’s development programmes could invest in land for permanent development as well as buy new plots from distressed sellers. One of the villagers explained that he was one of the first beneficiaries of the government subsidy for wet rice cultivation (he subsequently resigned as Village Council Chairman, being accused of appropriating large sums of village development fund). He received INR 700 in 1970 to develop terrace plots on his farm. Instead, he used the subsidy to buy three plots of land in the village that increased his landholding to five. His family were second settlers, and his father did not leave much agricultural land for him.

There were other ways in which land was consolidated not only by village elites and intermediaries but also by town politicians and neo-tribal elites who worked as political henchmen in the village and as political patrons. Villagers showed me plots of forest and patches of timber greenery that were developed from land bought by the local Member of Legislative Assembly (MLA) and townspeople who no longer lived in the village but acted as benefactors. The political patrons secured these lands through deals made with the village council members and their political representatives in the village. Often, clan affiliation works in securing control over village land. I was, fortunately, able to document the case of land consolidation as narrated by the son of a local MLA who has been planting valuable commercial trees in the area by securing land from neighbouring villagers. Over last seventeen years (1992-2009), he had planted four lakh saplings over an area of 370 hectares. Such large areas were planted in each successive session as the land was bought from surrounding villagers who earlier practised jhum. Villagers in distress sold land to the local MLA, who provided them with much-needed
cash and an incentive to grow maize and other crops for a few years until the tree stumps were large enough so that no food crop cultivation was possible.

The MLA’s plantation was supported by the village council, which is also the intermediary in solving village disputes. Hence, litigation against him was quickly settled. In the last days of my fieldwork, some neighbouring landowners laid claim to a portion of this farm. The former MLA rushed to the area and quickly organized a meeting with the local headmen and *dobashis*. Soon the matter was solved in the former MLA’s favour by the *dobashi* court. Over the years, people who have lost land joined the ranks of landless labourers, some working on the MLA’s farm, pruning the trees. This is seasonal labour. At other times they grew rice on a small plot of flat land where the MLA had promised to provide a dedicated water supply through pipelines. In 2003, however, the local MLA’s fortune changed as his political party was defeated in the election, and he could no longer sustain his plantation efforts as he had done from 1992. In 2008, he was defeated by the ruling party candidate, and since then, his plantation efforts have dwindled. The breakdown of the piped irrigation system in 2003 meant rice could no longer be grown to feed his plantation workers, who were mostly farmers from neighbouring villages who had lost their cultivable land or villagers who had sold their land for cash. With the decline of the MLA’s farm, they could no longer sustain their living with wages from tree plantation, weeding and pruning work. They were now restricted to growing maize and other dryland crops and working as manual labourers in the towns. The dreams of plantation-linked agro-activities and wage earnings have received a big setback.

This land consolidation story about one influential local MLA reflects how neo-tribal elites concentrate landholdings in their origin village through political patronage. In a similar fashion, the land began to be consolidated over the last two decades as the value of land appreciates in the study village with monetary exchange, through mortgage and other means of patronage that has excluded some farmers over their neighbours. These developments are also linked to the wider political economies surrounding consumption and the economic value attached to marketable commodities such as plantation and agroforestry that promise increasing returns. Additionally, the fetishization of organically grown fruits and grains in the hills also incentivises community members to appropriate land resources and marginalise others within the clan and village in the era
of market triumphalism. As Tania Murray Li (2014) poignantly points out through her engaging ethnography among the Lauje in Indonesia, the plantation of export tree crops leads to a literal lands’ end for farmers who have been pushed out of the village plantation economy by kin members. A similar phenomenon is unfolding in the slash and burn agrarian landscape of Nagaland, which complicates land use and land relations in swidden farming villages.

6. CONCLUSION

The established understanding of slash and burn farming as being anti-modern, non-changing, and a primitive means of production thus, oversimplifies the genre of farming dominated by an atypical ‘slash and burn’ cycle. Instead, current practices show how social relations between families and clans are hybridised by markets, state intervention, processes of glocalization, changing land relations and the commodity fetish. In this sense, we can argue that neoliberal approaches to governing the environment have become pervasive and, by definition, entail the commodification and consumption of nature, as mediated through market exchange. While commodification of nature has not been fully realised in slash and burn farming landscapes of Nagaland, the material construction of nature/ culture duality is established through practices of modern agriculture such as agroforestry and silviculture. The interaction between humans and non-humans through rituals and multi species networks in swidden ecology is no longer prized as modernist conservation efforts define ecological politics. Mithun protection has come in direct conflict with farmers’ land use and practices of monocropping, such as wet terrace rice cultivation. The story thus far has opened multiple facets of swidden farming that is evolving with expanding markets, communities’ aspiration to catch up with the outside world, consolidation of landholding and the growing predilection with climate change, deforestation, soil erosion and interrelated grand challenges which have called for alternative livelihood practices based on monocropping and sedentary farming. To this end, I have also demonstrated, following Li (1996, 2014) and others, how enclosures are initiated by local swidden farmers and kin members rather than directly forced by the state, market and agribusiness corporations.
CONFLICT OF INTEREST

There is no conflict of interest

ACKNOWLEDGEMENT

The author would like to thank the two anonymous reviewers for their valuable feedback.

REFERENCES


**How to cite this article:** Das, D. (2022). Jhum Cultivation among the eastern Nagas: Changing land, labour, and social relations in Nagaland. *Vantage: Journal of Thematic Analysis*, 3(1), 54-83

DOI: https://doi.org/10.52253/vjta.2022.v03i01.05

© The Author(s) 2022.
This work is licensed under a Creative Commons Attribution 4.0 International License which permits its use, distribution and reproduction in any medium, provided the original work is cited.