

# A Critical Physical Geography of Landscape Changes in Southeast Sulawesi, Indonesia, 1950s–2005



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## Introduction

Remote sensing has been increasingly utilized to study socio-natural change and tracking land use and cover change has been a particularly important application of remotely sensed data. Since 2008, open-access to the entire Landsat imagery archive has created the world's largest openly accessible library of geospatial information at 30-m resolution (Wulder, Masek, Cohen, Loveland, & Woodcock, 2012). The development of Google Earth Engine and other cloud-based computing techniques has also enabled this imagery to be processed and analyzed on the fly (Gorelick et al., 2017). Such approaches facilitate increasingly precise assessments of land use and cover change, enabling wall-to-wall land cover change maps for most parts of the world. New technologies for mapping land change also inform new environmental politics; shaping, reworking, and/or reinforcing prior accounts of change and transformation.

The current moment is thus a good time in which to highlight the histories poorly captured by remotely sensed data, and arguably, invisible to these techniques. These questions are pressing in tropical islands, which, like other tropical regions and ecosystems, have often been understood as places without history. In such locations, remotely sensed data not only appear to give new visibility where it was formerly lacking. They also orient a conversation of landscape change around those dynamics most easily captured by remotely sensed mapping techniques, in particular, forest loss. This chapter thus focuses on reconstructing relatively more invisible histories of landscape change in Southeast Sulawesi, Indonesia, here integrating

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ethnographic, archival, and remotely sensed data. It also explores the relative contributions of remotely sensed data to resulting accounts of change.

The Southeast Sulawesi site I focus on, like the insular tropics more generally, has long been assumed to be isolated by both choice and geographical circumstance, remote from trade and modernity. Often implicit in this framing, however, is the assumption that history first began with the remarkable boom in smallholder cacao production that took place from the late 1970s onward. As this chapter will show, however, while the landscape and market changes ushered in by cacao were significant, these changes are best understood as a product of earlier resource governance histories: from insurgency and counter-insurgency through the 1950s to the establishment of “political forests” in the 1960s to the elaboration of timber and rattan industries in state-claimed forests through the 1970s. These dynamics worked in and through localized politics and power relations to significantly reshape rural livelihoods, property relations and land use practices all before cacao was first adopted in many areas.

The corollary of these complexities is the partiality of remotely sensed records in shedding light on the varied processes that have shaped contemporary landscapes in Southeast Sulawesi. Not only are remotely sensed data limited in their historical reach, dating in this case to the first available Landsat images in 1972. They are also unable to untangle or reveal the complex on-the-ground relations shaping landscape change on their own (Dennis et al., 2005; Kelley, 2018; Kelley, Evans, & Potts, 2017; Turner, 2003). To supplement remotely sensed data in this case, I thus rely on both archival and ethnographic research. This data includes more than 50 oral histories and 40 in-depth interviews collected from two case study villages over roughly 18 months between 2014–2018. Wherever possible, oral histories and interviews were conducted during field visits, allowing for qualitative findings to be cross-referenced with remotely sensed data. Most oral histories and interviews were also taped and transcribed for subsequent analysis.

In bringing together these approaches, this chapter is thus inspired by emerging work within the field of Critical Physical Geography (CPG). Work in CPG draws closely on work from Political Ecology, sharing a strong interest in the dynamics of resource change and access that structure human-environment relations (Blaikie, 1985; Carney, 2001; Fairhead & Leach, 1996; Watts, 1987). Approaches within CPG, however, also commonly draw on techniques from physical geography and environmental science to enable a more explicit assessment of the environmental changes and conditions structuring human decisions and responses (Lave et al., 2014; Lave, Biermann, & Lane, 2018). Past work suggests that integrated approaches such as this can enrich understandings based solely on remote sensing or political ecology, unsettling, for example, the apparent stability of cartographic categories (e.g., Robbins, 2001) and assumed but unexamined linkages between state engagement and landscape change (e.g., Lukas, 2014).

Below, I first begin by reviewing known and unknown dimensions of landscape change in Southeast Sulawesi. I then turn to the re-reading of landscape change that is made possible by looking beyond the existing emphasis on cacao-deforestation linkages.

## Visibilities and Invisibilities of Prior Landscape Changes in Sulawesi

Southeast Sulawesi is often understood as a place without history; “a small undeveloped province which has struggled to attract much outside attention” (Midgley, Rimbawanto, Mahfudz, Anies Fuazi, & Brown, 2007). This representation reflects a thin archival record. Unlike Java, Bali, and many coastal regions in Indonesia, Southeast Sulawesi was not the site of a powerful state that has attracted historians’ attention but was inhabited by dispersed groups of swidden cultivators with strong kinship systems and weak traditions of kingship (Reid, 2011: 5). Most seventeenth and eighteenth century traders also avoided the eastern shore of the province entirely, scared off by coastal bluffs and severe storms. The few surviving accounts from the nineteenth century recount relatively barren coastlines.<sup>1</sup> The lack of information regarding the province in earlier centuries is reflected in the distorted geography of the province and lack of place information for Southeast Sulawesi in maps of Indonesia produced before the twentieth century (Fig. 1).

Among all the islands in Indonesia and Southeast Asia, Sulawesi has also been noted for particularly high levels of endemism, particularly of fauna; a fact which is all the more notable given as-yet limited taxonomic attention on the island (Wallace, 1869; Whitmore & Burnham, 1975). Southeast Sulawesi’s biological diversity is contained within various ecotypes, including mangrove, lowland, hill, karst, and montane forests, grasslands, and peat swamps and marshes fed by the Lalinda, Lasolo and Sampara (Konawe’eha) rivers (Whitten et al., 1987 ). This biological diversity, rather than being understood in relation to histories of human habitation,



**Fig. 1** Historical maps from Southeast Sulawesi. Early maps of Southeast Sulawesi illustrate how poorly known the province was prior to the twentieth century, even relative to other regions within Sulawesi

<sup>1</sup>As a comprehensive regional history by Will de Jong notes, merchant Jacques Nicolas Vosmaer noted deserted coasts when entering the Bay of Kendari (now the capital of the province) on May 9, 1831. The crew of a second ship entering in 1836 also noted few inhabitants; Buginese and Wajo traders rather than the Tolaki or Tomoronene peoples indigenous to the inland mountain regions. Near the Bay of Kolaka on the western side of the province, one traveler noted, “The East Indies fjords are beautiful, yet over it all hangs a shroud of gloom, mystery and mysticism, just as in the forests above on the black mountain ridges” (de Jong, 2017: 16).

has often been understood as part of the natural history of the area, with many forests considered to be ‘primary’ (Cannon, Summers, Harting, & Kessler, 2007).

These ahistorical presentations of Southeast Sulawesi closely inform existing stories of landscape change, most of which are oriented around a substantial expansion of cacao tree cropping (*Theobroma cacao* L.) into ‘virgin’ or primary forests (Ruf & Schroth, 2004). Up from almost no cacao production in 1979 when boom began, Indonesia produced more than 600,000 tons of cacao annually by 2002, with more than 90% of this production generated by smallholder producers on the island of Sulawesi managing under two hectares of land (BPS, 2018). This remarkable boom—considered to be “*one of the most spectacularly efficient* [smallholder cacao booms] *in the world*” (Ruf & Siswoputranto, 1995)—was widely celebrated as a development success. As is true in other key sites of cacao production globally (Nieston et al., 2004; Ruf & Schroth, 2004), however, Sulawesi’s smallholder cacao boom has also been seen as productive of deforestation, an understanding reinforced by accounts reliant on remote sensing (Erasmi & Twele, 2009; Erasmi, Twele, Ardiansyah, Malik, & Kappas, 2004; Steffan-Dewenter et al., 2007).

Cacao-deforestation linkages have also commonly been explained with reference to the ecological-come-economic yield advantages growers can obtain by planting cacao in tropical forests. Francois Ruf’s forest rent theory of cacao expansion, for example, argues that the Ricardian rents afforded by freshly cleared forested land—high soil fertility, low disease levels and protective shade for newly planted seedlings—combine with rapid in-migration and moments of opportunity in world markets to propel cacao expansion into forested lands. Forest rents also beget what Clarence-Smith and Ruf (1996: 1) suggest is the basic problem of cacao economies: “their need for fresh supplies of primary forest to maintain themselves.” Because forest rents eventually expire under intensive production, growing material and labor inputs are considered necessary to maintain the same yields. Assuming no premium to offset these costs, forest rent theory posits that forested land will out-compete existing sites of production.

Consistent with the forest rent theory of expansion, most work to explain smallholder cacao boom in Sulawesi has thus emphasized three key factors: first, Sulawesi’s ample forest reserves, particularly in the fertile alluvial lowlands and in sites of abundant rainfall (Durand, 1995; Ruf & Siswoputranto, 1995; Ruf & Yoddang, 1996); second, the in-migration of people of Bugis ethnicity into forested regions from the 1970s onward, many of whom had experience with cacao from an earlier regional boom in Malaysia (Jamal & Pomp, 1993; Pomp & Burger, 1995; Steffan-Dewenter et al., 2007); and third, the lack of trade or taxation policies in the sector, which allowed smallholders to benefit from some of the highest free-on-board prices globally (Akiyama & Nishio, 1997; Neilson, 2007; Ruf & Yoddang, 1996).

In other words, much work to explain cacao expansion has assumed that the historical and socio-spatial relations pre-dating cacao were largely contingencies (Leiter & Harding, 2004); a reduction compatible with more ahistorical remotely sensed analyses of forest loss due to cacao. More economic accounts of cacao expansion have also informed policy propositions in the sector, including claims

surrounding the benefits of yield intensification as a means of “sparing” further forest from clearance into cacao (Clough, Faust, & Tschardt, 2009; Neilson, 2007). Clough et al. (2009), for example, has argued that: “a failure to sustain production in current cacao-growing areas in Sulawesi likely means a shift to the forest margins” while Neilson (2007: 2) has noted that “[l]eft to market forces alone, the ‘mining’ of cocoa regions will in all likelihood continue unabated across tropical frontiers until all potential cocoa lands have been physically exhausted.”

Coupled to an emphasis on cacao as the primary driver of landscape change in this region, these arguments shape a largely essentialized and economic understanding of prior landscape changes. The next two sections expand these accounts by exploring the various land and livelihood transformations that pre-dated and conditioned the eventual shift into cacao.

## Alternative Accounts and Earlier Histories of Landscape Production

One of the most notable early accounts of landscape change in this region (though not originally written as such) is an ethnography of Tolaki people produced by Tarimana in 1989. Tarimana’s ethnography highlights the diversity of livelihood pursuits characteristic of indigenous Tolaki people in Southeast Sulawesi, including nickel and gold mining; swidden rice (*ladang*), rain-fed rice (*sawah*), and tree-crop production (*berkebun tanaman jangka panjang*); buffalo raising (*berternak kerbau*); swamp and river fishing (*menangkap ikan di rawa-rawa dan di sungai*); and forest product collection, including varied forms of hunting (such as for deer and anoa) and timber, rubber, and rattan harvest. As Tarimana shows, these diverse practices involved considerable landscape mobility as well as strategic and collective forms of landscape manipulation.<sup>2</sup>

While waiting for rice to yield, most people relied on corn as well as planted and wild cassava (*ubi*). Sago (*Metroxylon spp.*) was also eaten in the 1–2 months before the rice harvest when prior stocks of rice and corn had run out. An important subsistence staple in Eastern Indonesia, sago is also integral to Tolaki diet and food systems; planted along the banks of a river, along the edge of a swamp, or in marshy plains, and possible to leave untended for as long as 25 years before trunks are ready to be cut and harvested (Melamba, 2014). Many households also managed other tree crops in home gardens and in swidden plots (here, trees also served as a claim over lands). As Tarimana notes (1989: 84–85), this “*planting [was] not done in separate*

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<sup>2</sup>Temporary houses (*rumah kebun*) were inhabited during the swidden season, located at the borders of the larger complex of all households’ adjoining swidden plots. Fields were opened and planted side-by-side both to facilitate tasks performed collectively (such as field burning) and to saturate a given area, delimiting pest pressure on any single field. Some settlements instead practiced wet rice production in the lowlands, particularly near swamp forests in Lambuya, Rate-Rate, Tinondo, and Mowewe.

*areas for each tree species but all [were] planted in mixed systems ... [managed] during breaks in the management of swidden rice plots.*" These practices, in turn, produced many of the agrarian and forested landscapes later converted to cacao.

Tarimana's ethnography also recounts the complex forms of fish and wildlife harvest that complemented these practices, particularly during the rainy season before or immediately following swidden rice harvest. Fish were caught from streams, rivers, or swamps using hooks (obtained via trade) or with traps (made by women from rattan collected in the forest). During long dry seasons, fish could also be collected by drumming bamboo against the surface of the water in larger puddles to force fish into adjacent puddles, where earthen walls could be built about a foot high to prevent the fish from escaping. Fish could subsequently be caught by hand. Buffalo were also raised in grasslands adjacent to lowland or forest settlements, typically by elites. *Imperata* grasslands were either created through fire or could result from a state-shift in long-utilized swidden lands (see also Garrity et al., 1996 and Henley, 2002 for a discussion of these dynamics of grasslands elsewhere in the region).

Tarimana's account is thus important in depicting a landscape marked by use and manipulation; *cultivated* and *inhabited* localities rather than the primary or undisturbed forest systems believed affected by cacao expansion. A regional history by the scholar Will de Jong reiterates this point through a discussion of the multiple phases of colonization that contributed to landscape change prior to the 1970s, including that associated with the arrival of Buginese, Makassarese, Butonese, and sporadic English and Dutch traders from regional trade ports that brought ships to Kendari prior to the twentieth century (de Jong, 2017: 10). This trade activity seems to have grown around 1839 when the "narrow entrance" into Kendari Bay was discovered (Whitten et al., 1987), pre-dating the establishment of a Dutch colonial presence in the province in the early 1900s. Suggestive of the diverse forms of landscape manipulation that existed, de Jong notes (2012: 4–5) that items traded to and from Kendari likely included: "*poultry, fish, rice, cane sugar, salt, resins for lamps and torches, coconut oil, nutmeg, and its by-product mace, tubers (ubi in Malay), sago, peas, corn, beans, mangoes, coconuts, betel nuts and big and smaller boats, pottery, rattan, woven mats and hats, honey and beeswax, fishing lines, pigs, goats, cattle, poultry and hides.*"

Important to the more contemporary history of landscape change that follows, de Jong also suggests how dynamics of landscape use and manipulation would have shifted following the expansion of Dutch colonial interest in the region in 1906 when "the [Dutch] colonial state spread its wings in the eastern part of the archipelago and with its officials, rules, procedures, courts, taxes and reform plans penetrated to the farthest corners" (de Jong, 2017: 10). In Southeast Sulawesi, for instance, the Dutch widened and solidified road networks and built bridges to cross the diverse marshes, coastal flood forests, and river networks, focusing on reinforcing the east-west road between the port towns of Kendari and Kolaka using *herendi-ent* (enforced labor). The resulting network of gravel roads and paths subsequently became the basis for the formal establishment of new settlements (*kampong*), with

households given numbers and all tax-paying adult men given a *kampung*-identity card.

Despite the dynamics that limited colonial ambitions,<sup>3</sup> these engagements would have significantly altered landscapes and livelihoods through the first several decades of the 1900s: reworking demographics through the rapid spread of malaria, scabies, syphilis and other venereal diseases (18) and altering and intensifying resource production the introduction of trucks for forest product extraction, irrigation for wet rice production (22), and intensified mining operations for nickel, magnesium and chromium in sites such as Lapao-Pao, Oko-Okoko and Pomala'a (142). Subsequent Japanese occupation during World War II (1942–1945) further elaborated these pursuits. While no aerial imagery or remotely sensed data are available for this period, early maps provide some indication of the resulting landscape formations (Fig. 2).

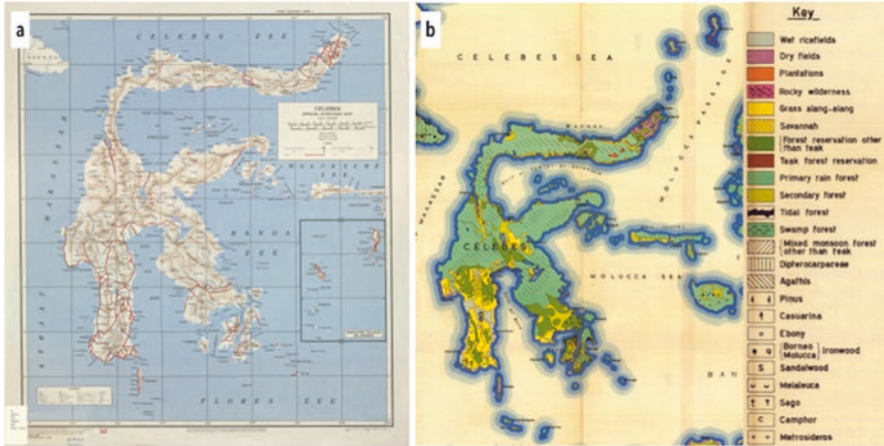
De Jong's account stops short of describing an important "fourth" phase of colonization on the island: that associated with the declaration of Indonesian independence in 1945 and formal acknowledgement of Southeast Sulawesi as an independent province in 1964 (Potter & Lee, 1998). This moment in time, however, was crucially important to subsequent landscape changes through the property and livelihood reconfigurations it shaped. These changes, as I discuss below, included the violence shaped by the Darul Islam insurgency (DI/TII) and associated counter-insurgency through the 1950s<sup>4</sup> and the shifts in land control produced by the 1967 Basic Forestry Law, which provided the basis for deeming many prior settlements and land holdings 'under-utilized' or 'unused,' and as such, property of the state (Peluso & Vandergeest, 2011). These two developments worked in tandem to reorder agrarian society, with many settlements that had been disrupted by political violence in the 1950s placed under state control by the 1960s.

As I show in the following chapter, development policies and processes enabled by the establishment of state control would shape much of the deforestation that has more commonly been attributed to the cacao sector. State land control also informed the abandonment of swidden fallows and adoption of tree crops in grassland ecosystems less subject to expropriation, processes productive of substantial tree cover gain over a four decade period. These processes did not unfold evenly across either

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<sup>3</sup>As de Jong notes, the building of roads, culverts, dikes, and bridges often "progressed slowly, not only because of financial constraints, but also because many *kampongs* existed only on paper, or were inhabited for just a few months of the year and therefore few or no laborers were available" (de Jong, 2017: 25). Even after the opening of the road network in 1930, "[o]ver land the peninsula of Southeast Celebes was not accessible by car from South and Central Celebes. In this respect it had the characteristics of an island" (de Jong, 2017: 24). Travel in the province also remained difficult by motorized vehicle or horse, particularly through the low-lying and muddy floodplains adjoining the arms and branches of major rivers in the province. These dynamics would also affect the viability of development schemes pursued by the Indonesian government following independence.

<sup>4</sup>This insurgency, which fought for the establishment of an Islamist state in Indonesia, involved guerrilla warfare from forested hillsides, a violence amplified by the arrival of counter-insurgency troops in the province.



**Fig. 2** Mid-twentieth century maps from Southeast Sulawesi. Despite their limited value in conveying the complexity of use arrangements that existed, these maps from the mid-twentieth century show the limited road network reinforced by the Dutch in the early twentieth century as well as the extent of cultivated land that existed by this point in time. The “Special Strategic Map” made by the US Army at the end of the Dutch colonial period in 1943 (a) for instance, shows the reinforced road network that would have facilitated accelerated trade, particularly during flood months when the river became dangerous to navigate by bamboo raft. A vegetation map composed by the Planning Department of the Forestry Service in 1950 (b) also suggests the significance of land held in either secondary forest or grassland (*alang-alang*) by this point, particularly in the lowlands of the Mekong and Tangeasinua mountain ranges

space or time, however, and were closely shaped by idiosyncrasies in settlement practices, the specificity of local resistances, and the exact configuration of institutions, actors, and interests present. The next section discusses what these distinctions implied for landscape change, and in particular, for the uneven ways cacao tree cropping spread.

## Reconstructing Landscape Change in the Konawe Lowlands, 1950–Onwards

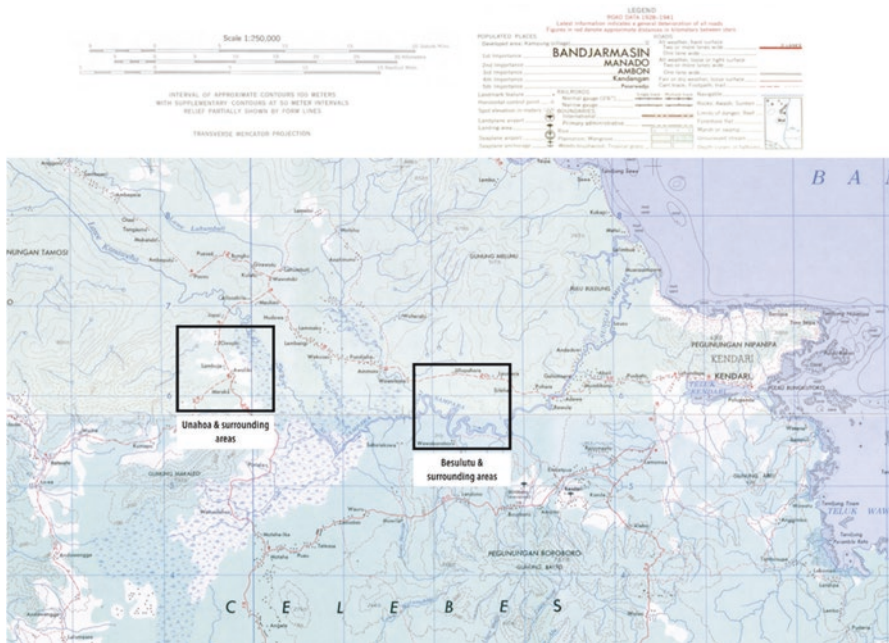
This section builds on the landscape history presented above by situating histories of landscape change in two lowland villages from the 1950s onward using oral histories, in-depth interviews, and remotely sensed data. I focus on the villages of Besulutu and Unahoa for comparative analysis because although they exhibit certain shared demographic or agro-ecological characteristics (Table 1, Fig. 3), they present contrasting histories of land and resource governance as well as road and market access. For example, though most land in Besulutu was nominally held by the state, no forestry officials would visit the area until 1981 given the muddy, watery plains and seasonal floods that affected mobility in and out of the area. In



**Table 1** Agro-ecological and demographic overview of the two villages selected for comparative analysis

	<i>Unahoa</i>	<i>Besolutu</i>
District	Kolaka Timur	Konawe
Population (2012)	769	731
Area (km <sup>2</sup> )	13.87	9.91
Pop. Density (ppl/km <sup>2</sup> )	55	74
First in-migration	1970s	1970s
In-migrants (%)	43%	57%
Avg. elevation (m)	170	50

An overview of basic demographic and agro-ecological characteristics of the two village case studies compiled with data obtained from Cannon et al. (2007). Village names are pseudonyms.



**Fig. 3** Map prepared by the Army Map Service, Corps of Engineers, 1965. This map, subset to the two focal study areas, illustrates settlements which had been formally established along the main road by the mid-1960s. It also provides a sense of regional topography

contrast, the areas around Unahoa became a base for provincial forestry and police departments, building on earlier colonial engagements and infrastructure. These differences were central to subsequent landscape changes.

## *Besulutu*

Prior to the 1950s, most people were formally settled outside the reach of what would become Besulutu settlement along the main road through the province. What would become the administrative area of Besulutu was a seasonal resource: exploited for the lands along the Konawe'eha River and for occasional swidden production in the hills. Riparian lands were used for vegetable cultivation and as a fishing grounds during flood months at the end of the rainy season. This remained true until counter-insurgency troops sent to contain the DI/TII insurgency burned homes in nearby Wawotobi in 1951, at which point, many individuals located along the main provincial road network fled inland. People fleeing to what is now Besulutu settled in a site they called Tundu Puri Wuta ('the end of the land'), a small "island" flanked by the Konawe'eha River on both sides and thus difficult for either army troops or insurgents to easily reach.

Following the re-establishment of peace in the province, most families that had settled in Besulutu stayed in the area even as other communities began to return to the main road. By the late 1960s, however, local government officials attempted to resettle these households to integrate Besulutu into administrative regions along the main road. Reminiscent of what Nathan Sayre has written on rangelands (2017), resettlement schemes further derived from a perception that the newly inhabited lands were difficult to control, understand, manage, or render profitable: "muck" moreso than productive agricultural lands. Schemes to develop and territorialize Besulutu from the 1960s onwards thus tended to focus either on ways to relocate people or to establish wet rice production in low-lying and flood-prone areas.

Oral histories suggest that the four family groups that had moved to the area amid conflict at first resisted relocation. During the years of displacement, they had claimed and managed flooded lands along the river for seasonal vegetable crops, including corn, soybean, eggplant, long beans, and peanuts. They had also claimed higher lands in the middle of the island and in the forested hillsides for swidden rice in times of rising waters, re-activating older family claims on land. When the district government ordered families in Tundu Puri Wuta to resettle to more established areas, they instead attempted to stay, with one woman recounting how they embraced an old coconut tree, holding hands with one another, and vowing to build life in the area. The families were eventually moved, not to a distant site, as had been proposed, but across the island into slightly higher lands adjoining the swamp.

By the late 1960s, governments efforts shifted to a strategy of further developing the area through local transmigration schemes, or by bringing other Tolaki people into the area while simultaneously converting swamplands into wet rice. Two specific in-migration schemes were pursued, a first in 1969 and a second in 1978.<sup>5</sup>

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<sup>5</sup>The first seems to have involved at least fifty households and the second 100 households, sponsored by the Social Welfare Department. Though the resettled households were provided with sugar, oil, dried fish, and other supplies for several years, support for irrigation was provided, making wet rice production a difficult prospect.

Through these schemes, each relocated household was allocated a  $50 \times 100 \text{ m}^2$  plot of land intended for wet rice production and settlement, with houses arranged in blocks mirroring villagization schemes elsewhere. Both schemes, however, failed to establish wet rice production in the area. People lacked expertise with wet or swamp rice production and regularly lost their crop to the annual floods. Many Tolaki people also seasonally abandoned wet rice plots for hillside swidden rice production. Most resettled households returned to their former settlements after just a few years.<sup>6</sup>

Despite their limited traction, the two schemes played an important role in structuring landscape change, including through their role in driving secondary forest and swamp conversion. Oral histories suggest an estimated 74 hectares of land were cleared between the two schemes, including land previously dense with timber species, bamboo grasses, and other cultivated vegetation, including planted sago palms and fruit trees. Simultaneously, because of their limited efficacy in effecting sedentary wet rice production, landscape mobility for swidden agriculture in the forested hillsides persisted, resulting in a mosaic of rotationally opened and fallowed lands. Such cultivations were particularly necessary in years of heavy rainfall when longer floods precluded early dry season vegetable cropping. During these years, tree growth was likely as common as tree loss; swidden lands were typically harvested for 1–2 years before being fallowed.

The 1979 transmigration scheme also transformed land uses in the area indirectly by brokering an important connection between a local landholder, Pak Sidik, and one of the wealthiest individuals in the province, Pak Wahab. Pak Wahab worked as a contractor on the construction of the four housing rows (*lorong*) for in-migrant households in 1979. During his time in Besulutu, and on the basis of his wealth and government connections, Pak Sidik invited him to take part in a scheme to plant cashew (*jambu mete*) in the forests of Sambarapa, an area in the eastern half of Lawouua. Pak Wahab quickly acquired much of the land previously managed for swidden agriculture,<sup>7</sup> later extricating it officially from state control with an HGU obtained in 1999 through government connections in Kendari. Many of these land transactions remain contentious decades later. In 2010, the initial use permit (*Hak Guna Usaha*, HGU) he had obtained would also become the basis for an industrial oil palm concession.

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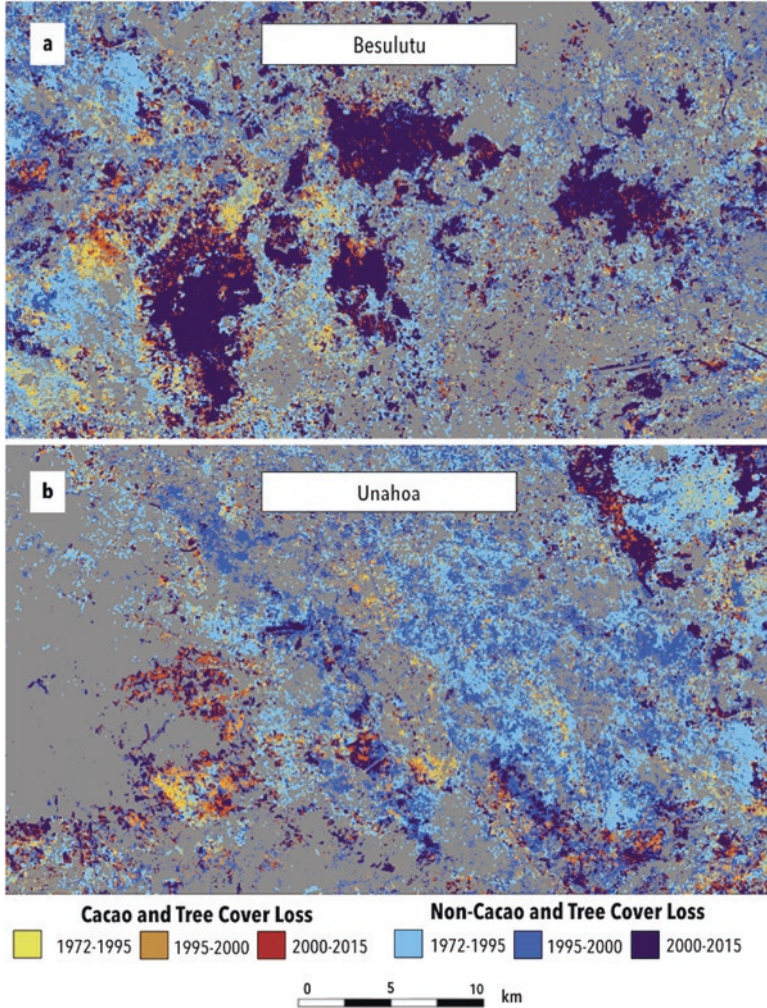
<sup>6</sup>The in-migration schemes also resulted in the official administrative designation of the area as a village; a shift that implied the need to maintain local populations even after local transmigrants had departed. The village head thus opened up the previously established resettlement lands to Javanese transmigrants from elsewhere in the province seeking new lands. As before, the intention was to develop rice fields in the eastern swamps of Besulutu. Because of the absence of paddy fields and irrigation, however, the Javanese families also lasted only several years. As time went on, some of the houses established as part of the resettlement scheme began to break down while others were claimed by local residents or entered into village holdings.

<sup>7</sup>Some accounts suggest that many lands claimed and sold by Pak Sidik were in fact held by other claimants unacknowledged in these transactions. Other people suggest that once the initial partnership was struck, cash-strapped families began to seek Wahab as a land purchaser. It is likely both accounts are true to a degree.

Pak Wahab's land acquisitions shifted land use practices by effectively enclosing many lands previously used for swidden agriculture. Throughout the 1980s and 1990s, Pak Wahab hired people from Besulutu and adjoining villages to clear the acquired lands for various commodity ventures. After a failed cashew scheme, for instance, more than 50,000 *segon* seedlings were planted. Around 20 hectares of rice were also planted in 1994 with plans to expand a small existing cattle ranch. These dynamics largely resulted in tree clearance as the *segon* trees that had been planted were mostly eaten by the handful of cattle that had been brought onto the property at an earlier point in time. Individuals' land use practices also continued to contribute to land change. Many land claimants continued to visit previously planted sago palms and fruit trees seasonally. Specialized forest product collectors and traders also continued to trade timber and rattan from lands acquired by Pak Wahab.

In 1997, Pak Wahab partnered with a parastatal cacao plantation that provided seeds and other inputs for production. Subsequently, 25 Buginese families were recruited into the area on promises of a *bagi tanah* or land sharing scheme that would return half of the opened land to Pak Wahab after cacao began to harvest. Cacao expansion further accelerated in secondary forested lands and former swidden fallows in the late 1990s amid administrative confusion following the fall of the Suharto dictatorship between 1997–1998 (McCarthy, 2004). Though the Village Head had prevented land sales for cacao in the hillsides more proximate the primary settlement in earlier years, a land broker took advantage of administrative confusion to approach the Sub-District Head (*Camat*), obtaining permission for the land sales from him. Land sales quickly emerged, enabling further in-migration, including among people learning of the program from their kin already established in lands controlled by Pak Wahab.

By 1998, the village had also been selected to participate in the Sulawesi Rain-Fed Agricultural Development Program (SRADP)—a partnership between the Asian Development Bank and the provincial Plantation Department that provided a staggering \$43.8 million dollar budget to support the expansion of cacao, pepper-corn and coconut, then the most important estate crops in the region (ADB, 2004). SRADP provided an initial 250,000 Rupiah to compensate growers for opening forested lands for production. It also provided title to the land, salary for planting the land in cacao, and seedlings, fertilizers and pesticides. While the availability of SRADP support further encouraged Buginese in-migration, it also led to the adoption of cacao among Tolaki people, including those who had previously left the area or left the area for temporary work elsewhere. By the early 2000s, these livelihood shifts would complete the reorientation of most Tolaki agricultural practices away from swidden production, in addition to driving the conversion of diverse forest fallows. Much more forest loss, however, was driven by earlier openings and by the eventual transfer of lands held by Pak Wahab to a corporate oil palm plantation in 2010, conversions which explain the major uptick in tree cover loss after this point in time (Fig. 4a). In other words, much of what presents as deforestation, even over just the past two decades, has had less to do with forest rents than it has with the shifting politics of access to and control over land.



**Fig. 4** Landscape changes in the two study areas, 1972–2015. **a** and **b** present data on the overlap between current cacao and non-cacao land covers and tree cover loss in Besulutu and Unahoa over the period 1972–2015. These images depict the centrality of non-cacao land changes to the story of landscape change in these areas. They also highlight that many cacao plantings took place in lands that had been cleared at an earlier point in time (including in lands cleared of trees at some point between 1972–1995). The methods underlying these data are detailed in Kelley et al. (2017) and Kelley (2018) and are reliant on tree cover loss data provided by Hansen et al. (2013) and Kelley et al. (2017). Non-cacao land covers mapped through this approach include wet rice, built surfaces, other forms of tree crop production, and forested land, and the uneven time intervals presented reflect a lack of cloud-free imagery prior to 1995

## *Unahoa*

In contrast with Besulutu, Unahoa had been well-connected to the primary road network since the 1930s. Correspondingly, the area was well-connected to nearby towns and to an ever-growing network of traders. The areas surrounding Unahoa were also the site of repeat colonization initiatives beginning in the early 1970s, with growers in Unahoa gaining access to seedlings for cacao and cashew by the late 1980s as part of a smallholder tree crop development initiative. In Unahoa, however, well-enforced state claims over forested lands successfully suppressed most swidden practices by the 1970s. State land enclosures also inhibited commodity-oriented tree crop plantings in protected forests until the early 2000s. Significant landscape changes nonetheless took place in the decades pre-dating cacao expansion, including forest loss linked to timber and rattan concessions and agricultural development schemes and forest regrowth in former forest settlements.

The strength of state land claims in Unahoa was linked to earlier Dutch and Japanese occupations. Because of the direct connections between the area and the primary road network, Unahoa and adjacent areas had become a key site of administrative activity throughout the twentieth century. Administrative infrastructure in the area was then used by the Indonesian Army to establish a base in the area during the DI/TII occupations. This meant that resource use practices repeatedly shifted in response to political violence. One woman that was 16 years old when the Japanese invaded, for instance, recounts that villagers were forcibly relocated from hillside settlements into the lowlands as part of a sedentarization and villagization scheme.

Tolaki households were prohibited from using the forest during the DI/TII insurgency and remained so after the reestablishment of state control in the area. As in Besulutu, efforts to suppress swidden agriculture largely reflected the goal of administratively developing state-designated villages along the main road. Settlement practices in Unahoa however were more strictly enforced than they had been in Besulutu. One woman, for instance, recounts around 20 people being arrested in the early 1970s and being put to work on a government construction project for one month after found using land in the protected forest for swidden agriculture. Respondents also recounted the time when many people relocated to former forest settlements during a protracted drought in the 1970s only to have police burn their forest dwellings (*rumah kebun*). As one person described: “*At that point, the village nearly died. ... It was as though the village didn’t have inhabitants. Finally so that they [the swiddeners] would come down (turun, i.e. to the flatlands), the government burnt their houses.*”

In this context, fallowed swidden fallows began to regenerate, shaping a growth in vegetative cover in many former settlement sites since the 1950s and 1960s invisible to the remotely sensed record. Simultaneously, the area became a key site of transmigration initiatives.<sup>8</sup> These schemes encompassed more area and many more

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<sup>8</sup>Transmigration schemes generally involve the movement of poor, landless, and other urban and rural people from more densely populated areas of Indonesia to less populated areas.

people than had approaches in Besulutu: between 1975–1984, more than 3000 Javanese and Balinese individuals were settled in the areas surrounding Unahoa adjacent to the Konawe'eha River (Departemen Tenaga Kerja dan Transmigrasi, 2014). Irrigation infrastructure was also established to ensure wet rice production. These dynamics produced bifurcated processes of landscape change from the 1960s onward. While satellite imagery captures the clearance of hundreds of hectares of lowland swamp forest in and around Unahoa where transmigration schemes developed, for instance, many swidden fields would have already regrown by the 1972 date of the earliest satellite imagery in the area.

Many Tolaki people continued to rely on forest resources despite the growth of wet rice in the region and despite risks of arrest or property confiscation, in part as a response to irregularities in irrigation water and challenges with pests in wet rice fields. Forest prohibitions, however, continued to gain strength throughout the 1970s and 1980s as the capacity of the Forestry Department to enforce state lands progressively improved. By the late 1980s, a state water company had also been established in the foothills proximate to former swidden lands. This led to the formal demarcation of state-claimed lands. It also led the Forestry Department to more carefully police state-claimed lands for swidden agriculture or other seasonal crops, perceiving such lands to be more vulnerable to erosion on the steep slopes. By the early 1990s, only a handful of swidden agricultural plots remained.

Two concurrent developments worked alongside these dynamics to reinforce forest gain and loss. The first was the de facto establishment of a concession within the forestry reserve for rattan extraction. The second was a growing emphasis on establishing tree crop production, with villagers granted permission to cultivate these crops on grasslands and some former swidden lands by the 1980s. These tree crop plantings produced substantial tree cover gain, particularly in former swidden lands or grassland areas. When the politics of access to forested land momentarily shifted with decentralization, local elites capitalized on the administrative confusion to sell 20 hectares of forests land to ten Buginese migrants seeking “cheap land” for cacao. These transactions would provide later basis for provisional land use rights following a shift in district leadership in 2004. From 1999–2004, however, their access to land was blocked by forestry department officials.

Though cacao production became possible in forested areas by 2004, eventual expansion was muted because the ecology and economics of cacao had eroded by the late 1990s. Pests and pathogens (the Cacao Pod Borer in particular) were widespread by the early 2000s and many growers perceived that expensive synthetic inputs were necessary to ensure the success of their crop. Simultaneously, the price of fertilizers rose by 100–200% between 1997 and 1998 with the removal of Green Revolution-era subsidies (Ruf & Yoddang, 1999). In this context, far less forest was cleared for cacao production than was cleared for other development opportunities and programs, including the timber concessions and colonization schemes in and around Unahoa (Fig. 4b). Building on the case of Besulutu, then, the case of Unahoa shows the processes of landscape change associated with cacao but largely invisibilized to date, in particular the role of tree crop plantings in “reforesting” grasslands and former swidden lands.

## Conclusions: Humility and History in Reconstructing Landscape Change

The years preceding cacao expansion saw tremendous, if highly variable, dynamics of landscape change. Landscape changes were produced not only by Tolaki livelihood systems but by successive waves of colonization, including that associated with early trade networks, Dutch colonization, and the establishment of Suharto's New Order regime and associated claims over forested lands. These changes were particularly notable in the lowland forests that would become a key site of cacao expansion through the 1980s, 1990s and early 2000s.

Overly emphasizing remotely sensed data in reconstructing these changes, however, would mask much of the complex environmental history with which cacao expansion intersected. Though remotely sensed data serve as an important tool in landscape reconstruction, supplementing these records with archival and ethnographic data here was essential in shaping three critical insights. First, that what has often been described in remotely sensed records as deforestation for cacao has often been the product of earlier development regimes. Second, that cacao expansion, tree crop plantings, and forest displacement have occurred alongside substantive tree cover gain and arguably, a story of forest regrowth. And third, that the forests cleared for cacao and other commodity or development ventures were not 'primary' or 'untouched' in any meaningful sense, but former logging lands, swidden lands, and existing agro-forests. Collectively, these insights compel a broader re-reading of cacao expansion, and help to understand deforestation not as a product of forest rents or in-migrants (per se) but as a product of the shifting and often path-dependent politics of accessing land and capital.

This case is thus suggestive of how historical understandings enabled by ethnographic and archival research can work alongside remotely sensed data to both supplement and shift dominant accounts of land use change (and the policy propositions that emerge out of such accounts). Such reconstructive projects are particularly important in island locales where an overemphasis on remotely sensed data or mapping discrete shifts in land change has often allowed for complex socio-spatial relations to be condensed into essentialized visions of nature and nativity; people and lands without history.

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