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Re-evaluating a tree's 'real worth': The historical dispossession of ecological stewardship and its legacy for a Japanese textile tradition

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ABSTRACT

This article explores the precarity that surrounds the acquisition of *techigi* (yeddo hawthorn) trees, a material used in the production of traditional and contemporary textiles, on the island of Amami Ōshima, southern Japan. A waste product of industrial forestry, the article suggests that the difficulties craftspeople face in accessing *techigi* are symptoms of complex historical and contemporary processes linked to property regimes and resource management that have dispossessed local residents of ecological stewardship.

KEYWORDS

Textiles; forestry; stewardship; Amami Ōshima; Japan

Introduction

The natural dyeing workshop Kanai Kougei located on the small but biodiverse island of Amami Ōshima in the Ryūkyū archipelago, southern Japan, uses a large amount of *techigi* trees to dye textiles. *Techigi* is the Amamian name by which both the tree (common name: Yeddo hawthorn, Japanese: *sharinbai*, Latin: *Rhaphiolepis umbellata*) (Figures 1 and 2) and the liquid used for the mud-dyeing process *dorozome* is known. The highly regulated craft process of *dorozome* is used to dye the yarn of the traditional Amamian kimono cloth *Oshima tsumugi*, but in recent years, on account of its 'natural' credentials, the process has been increasingly used by Kanai Kougei to dye apparel and homewares for designer clients worldwide. In this dyeing process, *techigi* tannins – molecules that protect trees from bacteria, fungi, or pests – bind with the iron that occurs naturally in Amamian mud, fixing colour to the cloth. A textile can be dyed from white to pink to red to brown, or, with repeated applications, to black, without the use of synthetic assistants (Figures 3 and 4). The majority of *techigi* timber sourced today by the workshop comes from local forest being clear-cut, with the *techigi* set aside by the woodcutters as 'waste', while the other felled trees are shipped to the mainland for processing into paper. As *techigi* tannins are red in colour, a quality that explains their utility as a dyestuff, the trees are unusable within the paper industry as they cause contamination and tinting of the pulp.

The contemporary dependence of Amami's natural dyeing workshops on the waste products of the forestry industry, and the illicit and informal processes required to

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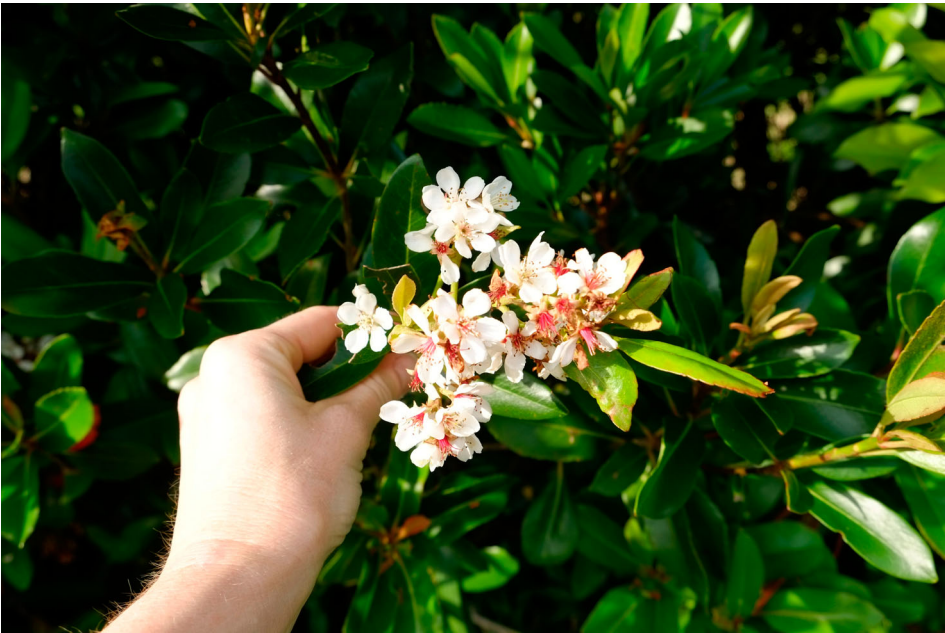


Figure 1. *Techigi* flowers.



Figure 2. *Techigi* logs.

obtain them, became slowly apparent during twelve months of ethnographic fieldwork at Kanai Kougei, where between 2017 and 2018, I worked as an unpaid dyer and used methodologies associated with apprenticeship (Marchand 2010). Being embedded in the day-



Figure 3. Silk yarns for *Oshima tsumugi* kimono silk around halfway through the *dorozome* (mud-dyeing) process.



Figure 4. Finished yarns dyed to black.

to-day running of the workshop, I was able to observe the comings and goings of people, materials, and orders. With the addition of interviews, informal discussion and site visits I collected a body of data that allowed me to establish the social, economic and environmental networks that sustain the traditional craft processes at the centre of the workshop's business (Linton 2021). Such was the case with *techigi*, and this article focuses on the relations and histories that define the timber's acquisition locally.

Initially, I found it difficult to establish how Kanai Kougei were able to procure 600kg of *techigi* every few weeks, with the timber delivered in the back of a beaten-up hatchback driven by the enigmatic Tanaka-san.¹ On one occasion, the *Shachō* (company president) told my colleague Kazuko-san that Tanaka-san had brought us a stolen tree.² 'Stolen?' I asked, a little surprised. 'Yes', said Kazuko-san, 'he took it from someone's mountain without gaining permission'. A few months later I heard that Tanaka-san had died unexpectedly, after suffering a heart attack while hunting octopus. Subsequently, the labourious job of collecting *techigi* fell to the craftspeople. Obtaining *techigi* was clearly becoming increasingly precarious, presenting a little-acknowledged threat to the future of Amami's textile traditions that are already subject to economic strain. Equally, this precarity represents significant shifts in the local consciousness around *techigi* and its place in Amamian material culture. In this article, I examine how and why a resource with a wide-ranging utility has been devalued to the extent that it is considered 'waste' with residents struggling to ascertain its 'real worth'. I argue that regimes of privatization and centralized resource management have dispossessed local communities of access to materials – and knowledge of how to use and sustain those materials – which contradicts the imperative to preserve both the environment and tradition. *Techigi* is an important case study as its story reveals the mutability and interchangeability of concepts of waste and value over the last two centuries. These concepts and their material and logistical formalizations have disrupted the ways that local natural resources are accessed, used and cared for in Amami. Significantly, I pinpoint the impact this has had on a geographically specific and culturally important craft process which in itself may offer sustainable solutions for contemporary design markets.

This research aligns itself with the work of scholars who have examined how property regimes that aim to maximize economic profit have disenfranchised local people of access rights leading to the loss of traditional knowledge, the criminalization of local practice and ecological destruction in diverse locations. Political scientist Arun Agrawal's (2005) long-durée method has shown how colonial interventions into forest management in India have created a hegemonic and enduring 'representational [regime] around forests' (2005, 30) that corresponds to statistics and numbers, impacting the way people understand the forest and their responsibilities towards that forest in the present. Anthropologist Anna Tsing's work in threatened Indonesian rainforests (2005) and on global matsutake mushroom supply chains (2013) has demonstrated how privatization that excludes people from land and prioritizes the value of commodities growing on that land can lead to illicit practices that are socially, environmentally and, ultimately, economically unsustainable. These scholars have shown that 'dominance' models of resource management institutes a state of precarity for local communities and their ecosystems while capitalism is able to thrive. I draw on Marxist economic geographer David Harvey's (2001) theoretical stance to show how capitalism utilizes the

spatiotemporal qualities of natural resources such as forests, to fix the 'crisis tendencies' of overaccumulation of capital and labour.

In the first section of this article, I ethnographically describe the context of Amami to show that dyeing work and the wider textile industry on the island is built on a foundation of low-wage labour and materials with ambiguous origin. I demonstrate how in supply chain capitalism value can be salvaged from waste and valorized through handcrafted labour, which repackages it as a commodity with a 'traditional' and 'green' veneer. I undertake an examination of how the situation today has developed by exploring the history of resource management on the island and changes in property law at the national level. I consider how, prior to the 1950s, Amamian residents were more reliant on the utility of their environment so understood the material, economic and spiritual value of sustaining natural resources. I explore how after the World War II the occupying Americans denigrated local practices and aimed instead to assist the Japanese authorities to make profitable their forestry industry by implementing processes of centralization. This followed an earlier line of economic development and nation-state building by the Japanese government who in their speed to modernize adopted property law that led to dispossession. Yet after the World War II, forestry was deemed essential for rebuilding the economy, so funding and recommendations to implement 'improvement' alongside land reforms occurred, which aimed to make land ownership more democratic. But reforms did not include forestry, leaving large tracts in the hands of the state and private ownership, meaning local natural resources have been made vulnerable to the instability of market forces. This legacy of resource management has left Amamian residents today unable to steward natural resources in a way that is beneficial for a wide conception of community. I question how stewardship might be restored but remain sceptical about the authorities' desire and will to bring about collaborative change.

Salvaging value from waste

The American anthropologist Douglas Haring visited Amami between 1951 and 1952 at the bequest of the U.S. Allied forces who occupied the island until its return to Japan in 1953. As part of his extensive survey (1952), he undertook an examination of Amamian industry and noted:

The stands of sharinbai [techigi] planted by the Japanese forest service are not being maintained. Amami foresters say that natural reproduction of these trees will suffice; the tsumugi dyers, however, complain that the supply of dyewood is shrinking. (1952, 5)

Haring's report was influential, and post-war investment by the occupying Americans and the Japanese government tackled *techigi* supply issues meaning that by the 1960s the textile industry could respond to a boom in demand for *Oshima tsumugi*. A luxury kimono cloth, the origins of which date back over a thousand years, that can command a retail price in excess of 5000 GBP, *tsumugi* brought wealth and notoriety to the island. By creating a system of industrially felling *techigi* and delivering it to a number of chipping stores, Amami's sixty dyeing workshops received a ready supply of timber, allowing them to meet peak production of 290,000 rolls of kimono cloth in 1972. In 1982, when the Shachō established Kanai Kougei, the increasing trend towards westernized clothing and later the burst of Japan's economic bubble meant that

tsumugi production was already in decline, as was the role of the chipping stores. The Shachō consequently purchased the same chipping machine he uses today, and relies on his own social networks to obtain enough *techigi* material to sustain his family's dyeing workshop. Kanai Kougei is one of only four companies that continue to produce yarns for 'Authentic *Oshima Tsumugi*', which can only be dyed and woven in Amami, and only two of these companies, including Kanai Kougei, accept regular work. The industry faces a precarious future, but since the 1990s Kanai Kougei has diversified by running dyeing classes for tourists and, since the 2000s, has established a sought-after contemporary apparel dyeing service (Linton 2020). The business' growth is the result of interest in traditional Japanese craft promoted by designer-friendship networks in large Japanese cities and also publicity in televisual, printed and social media. Whereas other workshops have maintained a skeleton staff, Kanai Kougei has more work than its team of four *tsumugi* dyers and six apparel dyers can accept.³ The workshop has struggled to attract committed young apprentices (of either gender) to carry out this labour intensive yet satisfying traditional craftwork, which encompasses a six-day working week. The situation at Kanai Kougei reflects a wider problem across Amami of shortages of people willing to do low-waged manual labour. Securing access to *techigi* is therefore another burden on the time but also the bodies of the workers.

Near to the end of my fieldwork, I followed the Shachō on the drive to collect *techigi* from the forested area of Uken in southern Amami. The fact that it took so long for me to experience this trip was explained by the unpredictability of the arrangement by which Kanai Kougei was able to source *techigi*, following Tanaka-san's death. When *techigi* is available, the woodcutters working on land being clear-cut sell them for cash on the side. The woodcutters phone the Shachō, and a member of Kanai Kougei staff will be sent to pick the *techigi* up. Climbing through the mountains, we drove for several miles down a poorly maintained road. A great brown scar in a landscape blanketed with forestry identified the clear-cut site. The simple skyline logging technology – a wooden tripod hoist suspending a pulley of steel wires attached to a gasoline-fuelled motor reel to drag trees off the mountain (Figure 5) – demonstrated both a lack of investment and the remote location's resistance to more advanced infrastructure. The woodcutters, two men over fifty, welcomed us. As they loaded up the Shachō's truck with *techigi*, the

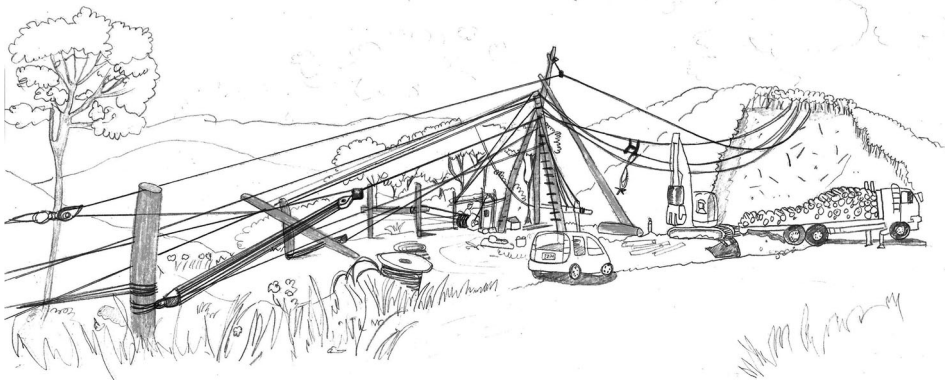


Figure 5. The felling site.



Figure 6. Loading *techigi* onto the truck.

suspension buckling under the weight, I confirmed with them that the ‘low-grade’ mixed broadleaf forest – Okinawan chestnut, crepe myrtle, and pine – was cut on rotation every forty years and extracted for making paper pulp (Figure 6).

During *tsumugi*’s boom period the tree’s roots were extracted from the ground, since the tannins located here are concentrated making them highly valued by dyers, but today the roots are left in the earth. Amami’s climate, which provides high annual rainfall and sunlight hours, means deforested trees will resprout or self-seed, seeing forests regrow with little human input making their management and logging economically efficient (Nakatsuhama 2007). It is likely too that the speed of logging, as opposed to the more intensive process of root extraction, is prioritized, with the knowledge of woodcutters relied on to pre-sort and codify contaminants as waste. As anthropologists Gregson et al. (2016) argue ‘sorting discarded goods into categories is the means by which value is created in resource recovery ... the more sorting ... work that occurs then the higher the purity [and price] of the resultant materials’ (2016, 546). Felling rather than extracting also has the advantage of sustaining the long-term supply of *techigi* through regrowth. As a result, for Amami’s remaining dyeing workshops, there is little concern about *techigi* resources depleting, rather it is the question of access to local trees that generates uncertainty.⁴ Despite *techigi* being endemic to South East Asia, Amami lies 210 nautical miles from mainland Japan so importing trees from elsewhere would be costly. Besides, this overlooks the point that *techigi* remains cheap because of the local conditions, which I shall describe, that keep overheads low for dyers who operate on tight profit margins. This is exemplified by the cash price – if the craftspeople collect the *techigi* the woodcutters charge 10,000JPY (about 70GBP) for one truckload. If they have it delivered to Kanai Kougei, a two-hour round trip, it will cost three times as much.

The processes that surround *techigi* highlight, on a small scale, the workings of supply-chain capitalism that are necessary in order to create value where initially there is perceived to be none. As Amamian wood is used for industrial paper it fetches a low market price. In order for a landowner to profit from its sale, the cost of its extraction – technology and labour power – must also be kept low. These circumstances recall Tsing's work on the informal economies of matsutake supply chains where she explains: 'Labor and natural resources are costs to be reduced by finding someone willing to take care of these issues for less' (2013, 25). Tsing's ethnography was conducted with Thai and Vietnamese migrants, and Vietnam veterans in the U.S. who lack access to social care, avoid taxes and often forage for mushrooms on federal and private property without permits, risking considerable fines. Tsing states that these pickers 'act as if the forest was an extensive commons ... [doing] their best to ignore questions of property' (2015, 78). I asked the dyers who owned the forests where the *techigi* grew. They vaguely explained that they were owned by small or large landowners or managed by the state or prefecture. *Oshima tsumugi*, still one of Japan's most luxurious textiles overseen by Amami's powerful Tsumugi Union, relies on this ambiguous regime where private and public property coalesce. As Tsing says:

Elite firms turn to supply chains to ... cut the costs of managing natural resources by allowing poorly regulated suppliers to steal, salvage, or forage raw materials ... Suppliers lower their costs by taking advantage of the privatization of what once were public or common domains; taking raw materials from such domains is a kind of stealing. Such arrangements raise urgent questions about private property as a precondition of capitalist commodities. What does it take to turn stolen, salvaged, and foraged materials into commodity value? (2015, 26)

Techigi was variously described as 'waste' by my participants when speaking English and *amatta mono* in Japanese, which translates as surplus or remainder. This linguistic choice draws attention to the fact that *techigi's* value is defined by a socio-economic construct, rather than a material reality. Like Tsing's mushrooms collected on private land, when *techigi* was felled from another's property and taken without permission it was defined as 'stolen', imbuing the tree with illicit connotations. Yet as a surplus resource that lacks value in one context and will go to waste if not utilized, value is recuperated that reflects resource efficiency. Even if *techigi's* acquisition is cloaked in a certain ambiguity, this example of resource recovery retains a positive façade of frugality or circularity that, in itself, has value for Kanai Kougei's more eco-conscious customers. These are medium to high-end designer brands who invest in the process's place-based, sustainable, traditional and 'natural' image. This efficiency continues once *techigi* arrives at Kanai Kougei's workshop, where a circular system is employed that makes use of both the raw material and its by-products. Logs are chipped, loaded into a cage and lowered into a cauldron containing spring water and *techigi* wood ash (1), an alkali that raises the pH to draw out tannins (Figure 7). The tannins dissolve in water heated to 80°C by a furnace (2). After being boiled for two days, the woodchips are removed, dried and re-used as fuel for the furnace (3). The cooled liquid is transferred to large barrels to mature for a week (4) before it is ready to be used for dyeing (5). Tsing states that 'raw materials must be translated into private, and thus alienable, commodities', (2013, 26) an extensive process of valorization evident in *techigi's* division across



Figure 7. Making and using *techigi* liquid.

multiple stages of production within the *dorozome* technique. But translating ‘stolen’ or surplus resources into a material central to generating a new product with commodity value also requires the social relations that remove the material from the forest; the truck loaded beyond its legal weight that transports it to the workshop; and the low-waged, or free labour of the Kanai family to check on the dyestuff preparation outside of working hours.

The need for *techigi* happens early in the *tsumugi* supply chain, and the Shachō’s son Yukihito-san, who runs Kanai Kougei’s apparel dyeing business, explained that the Tsumugi Union, who oversee production and represent the industry’s interests, are unlikely to interfere while this informal system functions. As he told me:

I do wonder if we could cover [*techigi* acquisition] more industrially. But the land where we harvest trees from are privately owned mountains. It would be easier for the craftsmen to do their work if [the Tsumugi Union] supported it. [The craftspeople] won’t lose their time

dealing with such issues – their full-time job is only to dye. *Techigi* is not owned by the dyers. They are Amami's. It would be good for anyone to cut and take it.

With the disappearance of a formal industry-wide system for reproducing and extracting *techigi*, the ability to access it today relies on personal relationships. *Techigi* suppliers build connections with specific dye houses so that each company can maintain its supply without competition. This builds obligation into the system, as seen when Kanai Kougei purchased a 'stolen' tree from Tanaka-san, who might otherwise have taken it elsewhere. Using social relations as a pathway, such spatially embedded obligation and commitment circumvents the competitiveness of the open labour market, and the regulation of labour defined by the state. Tanaka-san seemed to be one of many established residents and newcomers to Amami living off 'free' natural resources; foraging for shellfish, collecting rare wildlife for the black market, or hunting dangerous snakes for the local authorities. But many of these activities are embedded with personal risk, highlighting the precarity of this form of labour and the potential exploitation of an undocumented workforce. Tanaka-san, for example, died from a heart attack when hunting octopus; a risky job for someone who I guessed was in his 70s. In their ethnography of recycling processing in the U.K. and Belgium, Gregson et al. (2016) explain that recycling is framed as 'clean and green' – or in my case study 'sustainable and circular' – but resource recovery relies on low-skilled, migrant labour to carry out work that is 'dirty, often demeaning, physically demanding', frequently 'dangerous' and unappealing to the local workforce (2016, 543). Similarly, in Amami, Tanaka-san's death identified a weakness in the supply chain – that there are a limited number of people who are willing to do this form of work or have the specific ecological knowledge to carry it out safely and efficiently. I questioned the *tsumugi* dyer Kazu-san (aged 50) on the divisive subject of the availability of *techigi*. He answered:

Right now, with regard to this workshop, there is not enough *techigi*. Maybe it would be enough if we were only doing *Oshima tsumugi* ... I mean, there are plenty of trees but it's not easy to fell them. The problem is whether there are enough woodcutters ... Sometimes people from the workshop have to do the woodcutting ourselves.

The 2015 census put the number of forestry workers at 145, a fraction of the island's population of around 60,000 people (Kagoshima Prefecture 2018, 124). Uncertainty therefore resides not in the availability of trees but in the ability to obtain them. What will happen when there are no longer any woodcutters? Or if the form of paper production that underpins their official employment is deemed financially unsustainable? *Techigi* will be fixed in the landscape as private property and access restricted, forcing dyers to go to more extreme lengths to obtain resources, putting the future of this regional traditional craft in jeopardy. As Tsing explains: 'Through incorporating non-capitalist social relations, capitalism achieves its creative strength ... Such incorporation, however, is not something finished and under control ... it is an everyday problem. Capitalism thrives from it – but it also makes capitalism weak' (2013, 38).

The availability of *techigi* had become a contentious subject between the *tsumugi* and apparel dyers at Kanai Kougei. Since the early 2000s apparel orders have economically sustained the business, but at the same time, these orders required a lot of *techigi*. Craft production is assumed to be the opposite of what Marx imagined as alienated labour. But when *techigi* would arrive in the back of a vehicle as a commodity its life as

a tree was erased – so too the ecosystem from which it was gathered and the necessary labour that led it to the workshop. Being a ‘mobile asset’ (Tsing 2015, 6) sourced from ‘improved’ land, the younger craftspeople who were engaged in apparel dyeing had experienced alienation from their craft materials. It was not until the younger dyers collected the trees themselves that they better understood Kazu-san’s perspective, so tried to reduce the quantity of *techigi* liquid that they used for dyeing as, they explained to me, they now appreciated its ‘real worth’. These issues of alienation from the source of craft materials and the precarity of accessing them raises the important question of why *techigi* has been devalued to the extent that it is designated as waste by woodcutters and by regular members of the Amamian community, who often give *techigi* felled on their land to Kanai Kougei for free?

The post-war improvement of forestry ‘waste lands’

Whenever I would plan a hike in Amami’s forests, I was told *abunai-ne!* (dangerous!) by locals and advised not to go alone but to hire a nature guide. I would more frequently see guided tourists on rough mountain roads in 4×4s than encounter local residents. This paradox was often explained by the risks posed by deadly snakes, particularly the much feared *habu* (pit viper) that was responsible for 11% of Amami’s fatalities before the availability and effective delivery of antivenom (White and Meier 2017). Yet Amami’s forests are both beautiful and hugely biodiverse, and in July 2021 UNESCO recognized the virgin forests as worthy of World Natural Heritage designation. Nature being fundamental to Amamian identity means widespread ecological awareness exists among the public, yet ecological engagement tends to be confined to the agricultural fields, beaches and greenspaces of the villages and schoolchildren have little exposure to hands-on nature activities (Shimizu 2019, 28–29). While tourists visit Amami with the intent of seeing rarities, many Amamians seem content to enjoy surrounding wildlife through the proliferation of photos, cartoons and mascots that provide a natural visual language in the local media, via public education and the built environment (Linton 2021). There are of course exceptions; those who enjoy wildlife conservation activities, or who gain materially from working, collecting and foraging in the mountains. Shachō and Kazu-san, for example, have favourite hunting grounds for matsutake mushrooms and mountain crabs – seasonal produce that sustains social relations and their connection with the land.

Nevertheless, the situation today is in stark contrast to how people lived prior to the 1950s, when Ryūkyū islanders maintained a strong reliance on local materials for construction, medicines, cosmetics, clothing, fuel, food, tools, fertilizers and more. Today construction timber is shipped in from the mainland, and imported commodities have almost exclusively replaced local materials for everyday use. Evidence for these changes is apparent in the contrast between my own ethnographic data and the records held in forestry bulletins produced by USCAR (United States Civil Administration of the Ryukyu Islands), the administrative and governmental body that replaced the U.S. military government in 1950, and lasted until Okinawa’s return to the Japanese state in 1972. The bulletins (1952, 1953), collated by American and Japanese forestry experts, detail the island’s soil types, property distribution, forestry history, native trees and their wide variety of uses. For example, alongside its use as a dyestuff, historically *techigi* was prized for its berries

that were consumed during famine, its pink and white flowers, and its strength in construction and wind protection – essential qualities for a community exposed to annual extremes of subtropical weather. The aim of the bulletins was to establish the economic potential to ‘improve waste lands’ by implementing reforestation and its management across the Ryūkyū archipelago, so that the islands could be economically self-sustaining upon their revision to Japanese control (1953, 12). The addition of maps, statistics and photographs in the bulletins provide an impression of ‘colonial science’, a method learnt from European colonization and ‘imitated’ by the Americans (McNeill 2009, 476), who have their own imperial history in the Pacific and Caribbean, but also Korea and the Philippines.

Trees have always been important to territorial expansion and wealth accumulation, from the felling of mahogany by enslaved people on Caribbean plantations in the seventeenth century for European luxury furniture markets (Funes Monzote 2008), to the ornamental species planted along geometric lines that were seen to ‘bring order’ to colonial cities in the tropics (Mrázek 2002, 66). Arun Agrawal’s archival and field research in Kumaon, northern India is exemplary in demonstrating how the British colonial authorities in the early twentieth century constructed an enduring and hegemonic ‘representation regime’ that defined the status of trees, vegetation and soils by numerical calculus and erased previous ideas held by local people (2005, 34). By restricting access, criminalizing trespass, and simplifying ecological diversity, authorities also aimed to reduce the social diversity of those who relied on rich ecosystems for sustenance (2005, 5). As Agrawal explains, the command and control approach allowed colonists in India to ‘[remake] nature’ (2005, 201). Legal scholar Brenna Bhandar has shown how legal frameworks have dispossessed people of their land using a justification based on the ‘ideology of improvement’, where increased productivity of the land will lead to an improved society to benefit the ‘greater good’ (2018, 8). This thinking can be traced back to the work of Enlightenment philosopher John Locke (1632–1704) who believed that if ‘wastelands’ are made more productive via improvement, the rights to access and own that land as property are legitimized (Prudham 2011, 84–86).

This logic of improvement was adopted by the United States when they took possession of the Philippines from Spain in 1898 in the knowledge that the Philippine forests could solve timber supply issues caused by the over-exploitation of American forests (Bankoff 2009, 480). Whereas the conflicting laws and interests that governed U.S. property reduced the possibility of implementing widescale regulation at home (2009, 485–486), under colonial conditions the Philippine forests were both conserved and exploited by implementing no-cut zones and establishing National Parks, while commercial lumber was better accessed via improved infrastructure. Arriving to the Ryūkyūs in 1945, experts trained with the U.S. Forest Service encountered similar problems to those observed in the Philippines of low productivity and a style of highly localized and distributed forest management that was seen as an obstruction to the industry’s potential (Figure 8).

Japan is considered a ‘tree culture’ (*ki no bunka*) (Knight 1998), and has historically relied heavily on wood for domestic consumption, from the production of chopsticks and sandals to the interior and exterior construction of houses, temples and shrines (Hanley 1997, 54). Wood was a safe construction material in the event of earthquakes, while its availability and utility made it convenient for rebuilding in the aftermath of natural disaster (1997). Prior to the Meiji Period (1868–1912) foreign trading was severely

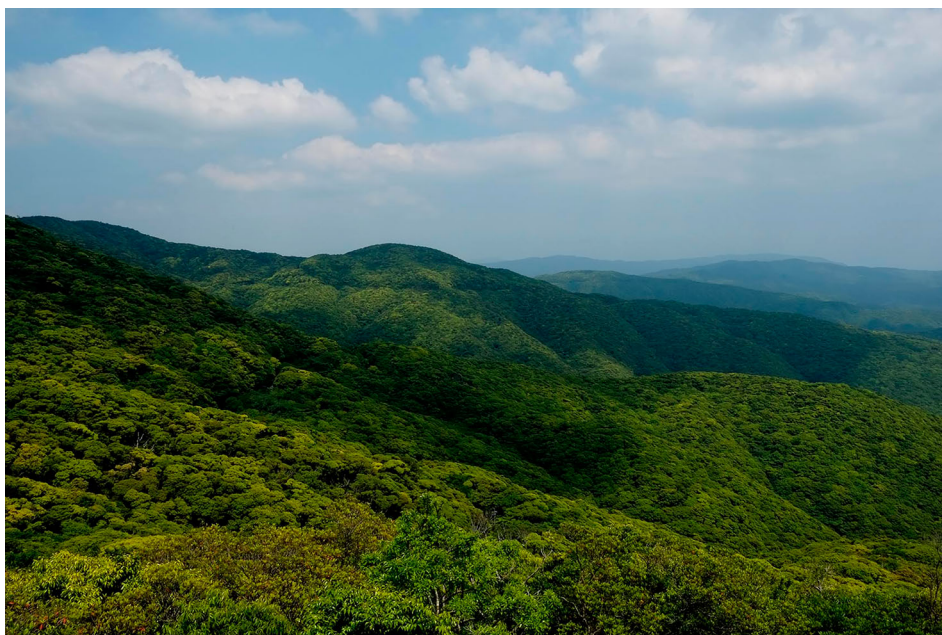


Figure 8. Amamian forest.

prohibited so to meet demand a sustainable timber industry was established (Totman 1989, 4–5). But after the World War II forests across Japan were being cut at a rate faster than they could naturally regenerate. Colonial expansion, the war effort and rebuilding of bombed-out cities led to unsustainable resource exploitation. This led the U.S. to organize the import of American and Philippine hardwoods, while the Japanese government encouraged the use of alternative materials disrupting long-established material practices and supply chains. Concrete and steel were used for building, and imported fossil rather than wood fuel was to be used to run vehicles, cook, and heat homes (Matsushita 2015, 92). Imported chemical fertilizers facilitated the goals of the Green Revolution by replacing forest products that had supported agriculture for millennia (Takahashi et al. 2019). Yet despite changing material needs, Japanese forestry was still deemed critical for future economic and environmental sustainability. The American ideal saw local management of forests replaced by ‘a unified national program’ overseen by state-level bureaucrats (USCAR 1953, 36).

This was the case in Amami, where forest management at the village level was said to be in parts ‘good’ (1953: 37) and soil and resource conservation ‘instinctive’, but U.S. foresters expressed frustration with residents who ‘in the absence of strong control’ overcut immature trees close to the village and ‘engaged in the destruction of timber resources’ (1953, 5). Amamians used coppicing for charcoal production that followed the *satoyama* model (Sugimura 2021, 48), a border zone between the village and mountains, which has been proven more recently to be beneficial to both people and wildlife (Takeuchi et al. 2003), and *okuyama*, where large trees were individually selected from the mountains to construct houses or dugout canoes (Sugimura 2021, 48). These indigenous practices were displaced by a programme of improvement that went hand-in-hand with legislation

that governed land access and property ownership. This was administered under American supervision by the Ryukyu Forestry Bureau, who set out to map forests, replant useful species, improve access, educate rangers and locals, build roads, police trespassers, establish boundaries, institute formal sales policies and fell old growth – the latter of which was deemed ‘decadent’, ‘defective’ and ‘going to waste’ (USCAR 1953, 22). This approach ignored embedded material stewardship and the animist cosmologies that had governed Amamian’s relations with their environment for centuries. Large ‘fearsome’ trees, for example, were considered home to spiritual beings designating them *kiranki* – ‘trees we don’t cut’ (Haring 1952, 68).

Until the twentieth century, Amamian spirituality had been grounded in complex cosmologies that share similarities with animist Shinto, the Japanese belief system where nature is considered alive with animate and inanimate beings. Before commercial interest in large trees, they were only permitted to be cut with permission from the *Noro* and *Yuta*, a theocracy of female priestesses who led the belief system (1952, 5). By the time anthropologist Douglas Haring visited Amami in 1952, suppression by successive rulers who wished to exploit a landscape rich in natural resources and plentiful labour, meant that the priestesses authority had been degraded and many rituals no longer practiced, yet belief in spiritual entities and black magic still held strong (1952, 63–71). As Bhandar explains, ‘if the possession of land was (and remains) the ultimate objective of colonial power, then property law is the primary means of realizing this desire’ (2018, 3). As a means to legitimately dispossess a community of land and ecological knowledge, ‘laws of property’ were needed to ‘reflect and consolidate language, ways of seeing, and modes of subjectivity that render indigenous and colonized populations as outside history, lacking the requisite cultural practices, habits of thought, and economic organization to be considered sovereign, economic subjects’ (2018). This racialized and paternalistic view, instrumental to the formation of the settler colonial narrative, has become hegemonic in ‘the intimate bond between state property and private property ownership’ (2018, 18). Although these ideas have a history embedded in Western scholarship, after the Meiji Restoration (1868) they were increasingly imported into Japan as a means of ‘modernization’.

The laws of property

While property laws diverge in every country, tracking the history of land rights and access in Amami demonstrates how, to prioritize economic development, legal frameworks have become increasingly uniform at the global scale, lacking the diversity that suits the welfare of local populations and their distinct geographies. I have suggested that changes in local consciousness about the utility of Amamian natural resources occurred, most significantly, in the post-World War II period. Amami became accessible to global commodity markets, and increased wealth and living standards displaced subsistence farming and foraging practice. However, Amamians were incrementally dispossessed of land and ecological knowledge much earlier, the result of changing political regimes and corresponding economic policy that cemented dominant conceptions of property and land access into the public imaginary.

Prior to 1868, the Japanese people lived under feudalism where territory was controlled under a *han* (domain) system of powerful landlords. The domain provided villagers

with access rights, with tax payable in agricultural produce. Between the fourteenth and twentieth centuries, these rights were based on a *warichi* (split land) system, and while *warichi* differed in every region (Brown 2002), in Amami, ‘house lots, paddies, upland fields, and mountain land’ were redistributed every three to five years between adults (USCAR 1953, 6). This meant that land was ‘roughly comparable to holding shares of stock’ in the village, (Brown 2002, 42) with no individual ‘owning’ the best land and tax paid as a village unit. Accordingly, it was in the collective interest of the village to care for the landscape holistically. In addition to tenurial rights, local authorities across Japan expanded use-rights and restrictions to forests and commons to lock villagers into social contracts of mutual responsibility across large tracts of land and temporal periods. Historian Conrad Totman’s *Green Archipelago* (1989) details how the Japanese supported its burgeoning population that swelled from 18 to almost 35 million people (Hanley 1968, 622) across the Tokugawa period (1603-1867) by moving from clear-cutting virgin timber, which resulted in deforestation, towards ‘regenerative forestry’ that facilitated plantation silviculture and naturally seeded forest management, arising independently to similar German practices established during this time (Totman 1989, 4–5). Totman claims however that these partnerships eventually dissolved, since the domain could enclose land at will and landowners moved increasingly towards more profitable monoculture forestry, that lacked the biodiversity that sustained the village (1989, 178).

Since arable land is scarce in Amami, as the population swelled land became highly divided. Added to this burden, the forced cropping and payment of tax in sugar to the Shimazu’s – the powerful rulers of Satsuma domain, current day Kagoshima Prefecture – was introduced in 1745. By 1820 the Shimazu’s instructed rice paddies to be drained and replaced by sugarcane to implement monocropping (Hellyer 2009, 95–96). Because of the low amount of cultivatable land, there was a high reliance on forestry to both improve the soil and for sources of nourishment (Nakatsuhama 2007, 51). Nevertheless, crop failure – a frequent occurrence due to extreme weather – led to debt and widespread famine. As a result, many residents became ‘*yanchu*’ (slaves or indentured labourers) in the households of the village heads who acted as officials, suggesting these households ultimately grew in people but also land (Hagihara 1974, 248–249). The resulting profits from sugar brought wealth and power to the Shimazus, funding their overthrow of the Tokugawas to establish ‘modern’ Japan, starting the Meiji Restoration (Haring 1952, 77).

After 1868, laws were passed to transform land ownership from a ‘feudalistic landlord’ to a ‘farmer-owner’ system, alongside a record of title registration (Takigawa 1972). *Warichi* (split land) was outlawed since taxes were now tied to the value of a *specific* parcel of land (Brown 2002, 46), and commons became the property of communities but under municipal or prefectural management (Takigawa 1972, 305). Whereas in earlier eras, sustainable forestry developed to meet local needs, nationwide Forest Acts were established allowing a united Japan to meet the demands of industrialization, colonial expansion and military action. A stream of laws that were becoming increasingly centralized and nationalistic in character meant the productivity of the land provided cash profit and tax revenue prior to industrialization, supporting public services, agricultural development, and ultimately the founding of the nation state (Takahashi et al. 2019, 1021–1022).

It is helpful here to introduce the example of the ‘Boss of Kagoshima’ (Fortune Magazine 1992), businessman Yohachiro Iwasaki (1902–1993), founder of Iwasaki Sangyo Corp. Iwasaki made his fortune by supplying railway sleepers to the Japanese government after the Great Kanto Earthquake in 1923, before moving into postal services and, after an export ban was lifted in 1930, gold mining.⁵ In 1943 Iwasaki bought 12,000 hectares of land in the Uken mountains (the area that I visited with Shachō), equivalent to 10% of Amami’s forests (Sugimura 2021, 48). My fieldwork participants informed me that the large trees on Iwasaki’s land were extracted and sold to the government for railway construction in Japan’s colony of Manchuria, a narrative supported by environmental scientist Ken Sugimura (2021, 48–49). Although it is only supposition, since without further archival research one cannot know the conditions of sale, one might assume that the Japanese government supported this land sale in Amami at a moment when it needed funds but also the services and materials supplied by timber merchants for military expansion.

After the World War II the occupying Americans directed an overhaul of agricultural land ownership to tackle the problem of ‘absentee landlords’ – mostly city-dwelling non-farmers (Hagihara 1974, 290). Laws were instituted that reduced individual land ownership to 1.0 ha, with any excess sold to the government and then on to tenant farmers. The push for these reforms aligned with the writing of the 1947 Japanese Constitution, penned by American authors and based on ‘the Western theory of natural rights’ that found their origins in Locke’s philosophy (Repeta and Jones 2015, 314). American influence was not just material but also epistemological, embedding the Lockean sense of freedom and the rights of the individual into the Japanese legal system. In Amami however, historian Shigeru Hagihara (1974) claims that the reforms failed, since ‘parasitic landlords’ either registered land exceeding 1.0 ha in a family members name, or signed land over to tenants with unrealistic loan conditions knowing they would default (1974, 259). Yet many of the Amamian families with whom I researched owned their houses and house lots, and most had access to small fruit groves, vegetable plots or parcels of forest. They explained that their families bought the land in the first half of the twentieth century, but were unsure of exactly how it came into their possession.

When discussing land ownership with my participants, issues were often raised with the ‘*tōki*’ (*fudosan tōki* – real-estate registration), which details the owners of land/and or buildings on a central registry providing official documentation. Despite land registration existing in some form since 1869 (Takigawa 1972), I was told that transfers of ownership were in the past done orally in Amami, without paperwork but built on a system of trust. The Shachō told me that when his neighbour sold a parcel of land that he thought belonged to him, the neighbour explained that many years ago the Shachō’s family had exchanged the land for pigs. Since there was no *tōki*, the Shachō had to take his word. A similar problem was recalled by Kazu-san who explained that when the authorities wanted to buy part of a road that his family had built, all the owners of the land couldn’t be identified making the sale challenging. Kazu-san offered a second example by explaining that when the state undertook a significant project to establish landownership in Amami around 2015 (around the time when the Amami Guntō National Park was being established), the boundaries of his land were queried, so he had to pay again for land that he believed he already owned. With such divided land ownership, it is difficult for local people to know which forests belong to whom, but with land held locally issues can be resolved. With large off-island landowners, however, such as

Iwasaki Sangyo, local people are unsure where the corporation's land is even located and when they do know access is prohibited. My participants elaborated that in the past when villages suffered significant landslides or typhoon damage, Iwasaki Sangyo would not grant access through their land when the public right of way had been blocked. For reasons such as these, the company are hugely unpopular with Amamians but also, I was told, throughout Kagoshima Prefecture.

The history of land ownership in Japan demonstrates how land is a means to accrue wealth and therefore power, a factor that post-war land reforms instituted by the Americans attempted to address by bestowing the 'rights to life, liberty and property' (Repeta and Jones 2015, 314–315) to individual tenant farmers. Yet legal frameworks and also land taxes have disadvantaged small landowners today, since in the past levels of literacy were low and cash was in short supply while social relations took preference over paper documents. Essentially, the reforms failed to understand the role of the village in Japan as an independent, bureaucratic unit that conceptualized the landscape – the mountains, forests, village and sea – holistically as part of the community (Linton 2021). It is also important to stress that post-war reforms were directed only at agricultural land not forest land, which explains how Iwasaki Sangyo continue to control a sixth of Amami's forests (Sugimura 2021, 51). Since trees were seen as a resource necessary to benefit the 'greater good', the rights to access communal forests were not considered worthy of protection and large-scale private ownership left untouched (Takigawa 1972, 290). Private ownership of forest land is as high as 90% on the island, a number that exceeds the average of the whole of the country (Kagoshima Prefecture 2018, 118). The fractured nature of land ownership, meanwhile, has made collective decision-making – whether to exploit or protect the environment – challenging in the present.

State, private or community management?

In many rural areas of Japan such as Amami, residents practiced a subsistence lifestyle into the 1950s, with the harvesting of forest products a whole family pursuit (including children) and carried out around the agriculture calendar to supplement income (USCAR 1953, 26). People's relationships with natural resources were bounded by both a spatial and temporal proximity – accounting for the material development of processes such *dorozome* and the weaving of the kimono cloth *Oshima tsumugi*. But in the latter half of the twentieth century, an economic understanding of the value of trees, that was mutually beneficial for both local communities and the state, came to dominate. The Japanese Government instituted a range of Forestry Laws to secure future sustainability and make Japanese timber competitive by better utilizing common land for profit-driven exploitation and ease the way for privatization (Takahashi et al. 2019, 1022). In addition, laws initiated by the Americans meant that between 1951 and 1963 all of Japan's public and private forests were subject to 'compulsory [silviculture] regulations' (Matsushita 2015, 103), with many forests replaced by monoculture plantations of Japanese cedar and cypress (Knight 1998). Community relationships with forest ecosystems, their broad utility and cosmologies, were therefore severed from the everyday functioning of social and material life.

Converting forestry into a professionalized industry, in Amami introduced mobility into a local system allowing the state to syphon capital through untapped natural resources

and solve supply issues on the mainland while subsistence farmers would become tax-paying labourers. Forestry and the construction industry (on which forestry relied to improve logging access and infrastructure) provided wage-labour for men for whom migration to Okinawa or the mainland had become a necessity (Haring 1952, 8). Regulating forestry as both a long-term capital project, and as a means to relocate labour according to such temporal cycles, is an example of capitalism's need to be fixed in a territory or economic unit while allowing capital and labour to move 'beyond the boundaries of the space or region in which it was generated' (Jessop 2006, 147). In the Ryūkyūan forests, it could be argued that USCAR and the Japanese government created the conditions for what Harvey (2001) terms a 'spatiotemporal fix' by using geographic expansion and temporal deferment as a method of absorption of surplus capital (trees going to 'waste' in the mountains) and labour (high levels of unemployment in rural areas)⁶.

Yet the authorities did not account for imminent changes in market conditions, and the resulting instability caused by the mobility of capitalism. The example of Japanese forestry demonstrates 'one of the central contradictions of capital: that it has to build a fixed space (or 'landscape') necessary for its own functioning at a certain point in its history only to have to destroy that space (and devalue much of the capital invested therein) at a later point in order to make way for a new 'spatial fix' (Harvey 2001, 25). Industrialization, market expansion and urbanization degraded the industries of forestry and agriculture, increasing Japan's dependency on imports. By the early 1970s timber from the Philippines and U.S. accounted for 60% of Japan's softwood market (Cox 1987, 35), a source replaced in the 1980s when Japanese trading companies under-cut local timber by dealing with the corrupt Indonesian government to harvest tropical rainforests (Tsing 2005, 14–16). While the costs of imports remained low, Japanese forestry also suffered from destructive pine nematodes that were brought in with U.S. timber and a declining workforce due to out-migration from rural areas (Cox 1987, 37). As Harvey would claim, 'spatiotemporal fixes' are helpful for as long as they are profitable and by the 1980s, Amami's state and prefectural forests that were logged for paper and biofuel products were running a 'negative profit' (Sugimura 2021, 53–54). Despite this Amami's industry was able to draw income by accruing government subsidies to rebuild old and construct new mountain roads to improve logging access (Sugimura 2021, 53–54). So rather than providing profitable material reserves, the role of forestry had become a means to support the local economy through job creation.

After the World War II, forestry and *Oshima tsumugi* were highlighted as areas for innovation and investment by the occupying Americans. While forestry plans soon withered, the Japanese state proactively created regional boundaries as a way to bolster domestic tourism and investment in national heritage. The nostalgia for traditional kimono that swept across the country with the nation's rising wealth meant that *Oshima tsumugi* could employ 20,000 islanders at peak production in 1972 (Linton 2021). Capital and labour was fixed in Amami not through forestry, but by the boundaries of tradition allowing the state to maintain 'structured coherence', a region's 'capacity to impose relatively firm boundaries on otherwise porous and unstable geographical edges' (Jessop 2006, 154). Quality and authenticity were tied to local hand labour, intangible skills and folk traditions that were geographically fixed. Designated a Dentou Kougei (traditional craftwork) by the government in 1974, *Oshima tsumugi* was able to thrive in the 1970s by taking

advantage of the cheapness of forest products such as *techigi*, following the economic devaluation of local forests and the removal of these products from everyday circulation.

The private sector also moved on from forestry. My participants explained that after Iwasaki Sangyo felled large, profitable trees they ‘abandoned’ much of their least accessible land since there was no benefit to ongoing investment, an argument supported by Nakatsuhama (2007, 52). While the sheer scale of their ownership had dispossessed the community of access, Sugimura claims that ‘extracting’ then ‘abandoning’ has had the unintended consequence of protecting the islands old-growth forests from logging (Sugimura 2021, 51). This is because it was not until the 1990s that the local authorities began to reject clear-cutting of virgin timber on sites under their management and instead recognized the value of conservation, which could be capitalized on for nature tourism (2021, 90–91). Although Iwasaki Sangyo continued logging operations – including clear-cutting for paper pulp – from 1948 they responded to growing consumer trends shifting their main business to tourism and transportation, building hotels, golf courses, and establishing ferry services to remote islands such as Yakushima and Amami. As a consequence, in 1992 at the age of 90, Iwasaki’s approach to business, which he claimed was in speculating on the future value of land, gave him billionaire status making him the 115th richest man in the world (Fortune Magazine 1992).

In 2017 in preparation for Amami’s recognition as a World Natural Heritage site, the Japanese government converted the island’s old-growth forests (initially earmarked for logging by USCAR in the 1950s) into a National Park and acquired the surrounding area from individual landowners as an environmental buffer zone. This is a practice that legitimizes the acquisition of property under the guise of preservation and conservation, using legal frameworks to promote but also sustain natural environments to benefit ‘the greater good’ (Mollett 2011). Although centralized initiatives of conservation, preservation and resource management are often imagined with good intentions, the opening of a World Natural Heritage site could be framed as yet another economic ‘fix’. As Sugimura stresses, critical decision making on the future of forestry in Amami has always been ‘top-down’ without a full understanding of the ‘complexity of the situation’ which should include ‘biological, silvicultural, social, geographical and historical factors’ (2011). Commentators stress that the balance between ‘protection and “utilization” should be maintained in consultation with the local community and the environmental education of children should be prioritized’ (Nakatsuhama 2007; Kuwahara 2011; Shimizu 2019). While there were efforts to consult with the community on the World Natural Heritage process, on the ground there is little evidence that this had an impact on everyday life, with many of my participants raising concerns that World Natural Heritage would be more beneficial to the Prefecture than to ordinary Amamians (Linton 2021). So how might the community regain some autonomy to re-establish the Amamian forest’s ‘real worth’?

In a 2013 paper, environmental philosopher Mitsuyo Toyoda proposes a return to the commons. Toyoda has joined other scholars of common property rights (Ostrom 1990; Gibson, McKean, and Ostrom 2000) by suggesting that rather than external authorities such as academics, scientists, bureaucrats or corporate partners setting the agenda, a democratic approach that employs community decision-making with input from experts should be taken. Toyoda uses the example of such a project on an estuary on the Sea of Japan where the local fishing industry, but also municipal infrastructures,

had caused water pollution. Key to the project's success was the inclusion of multiple stake holders and generations, since for older fishman 'the concept of sustainability [was] too abstract and [could not] be connected with their everyday concerns' (2013, 290). But by involving local children, the fishermen were able to imagine a future for the estuary. Toyoda suggests that it is 'crucial to consider how to re-identify values in the natural surroundings and turn them into important resources that people care about and care for' (2013, 291). Agrawal's research carried out in India for several decades also supports the effectiveness of community management, which he describes as an intimate form of regulation that 'operates more constantly, consistently, effectively, and transformatively on its ... village residents' while it is also 'less costly', 'more autonomous' and 'more humane' (2005, 93) than external regulation. He explains: 'localities and their residents become participants in conservation on the basis of a transformation in the understanding of the place of forests in social life' (2005, 103).

Japan has a wealth of experience with community-driven environmental restoration and management projects (Takeuchi et al. 2003; Satsuka 2014) and these examples demonstrate that if provided with agency and support, local communities are more suited to environmental management: firstly because they have self-interest; secondly, because social pressure encourages self-governance; and lastly, residents tend to have ethical, genealogical, and/or spiritual connections with things and places that prompt the adoption of sustaining processes, whose flexibility cannot be matched by external management.⁷ The ability to enact care based on informed ecological knowledge was apparent when I asked Kazu-san whether the age or growing location affected the colour of the *techigi* dye. As he told me:

The best place to grow *techigi* is on the coast because sunlight reaches it. Deep in a mountain forest ... the tree grows big, but it has to mature quickly in order not to be in the shadow of the surrounding trees, which makes the colour of the dyeing liquid thinner, compared to coastal *techigi* trees. When you break off the coastal *techigi*'s twigs, they are already red-coloured inside. The ones on the mountainside are whitish in colour.

Re-engaging the community in forest management in Amami would require a new paradigm for the laws that govern property and a shift in mindset among the population. While gaining access to village forests, termed *Kaihō yama* (open mountains), is still possible on the island, village heads tend to be responsible for negotiating logging with private companies on resident's behalf (Nakatsuhama 2007, 51). Although instituting changes to management appears a huge undertaking, the fact that property ownership was challenged in order to establish the World Natural Heritage site shows just how important protected zones of international interest are to the 'national' project. Yet whether there is the will to implement such seismic change in management that could directly benefit the everyday needs of the local community and reconfigure local relations with the forest remains to be seen.

Conclusion

Throughout this article, I have shown how the cultivation and management of land in Amami has increasingly been used to generate value by those with the power to accumulate capital. Commoditization, at least within the timeframe addressed, has moved from rice and sugar to forestry, textiles, and latterly tourism with the environmental value of the

forest ecosystem superseding its material value. The forest has been re-conceptualized from a space embedded in the social, spiritual and economic identity of Amamians to a place governed by statistics. As a result, a resource with wide-ranging utility such as *techigi* has been designated ‘waste’ in the manufacture of an off-island industrial commodity. By focusing on a tree essential for dyeing textiles, I have highlighted that while industrial methods of resource management can be profitable, benefits are often only short lived since local contexts are subject to national and global market forces – and in the era of climate crisis – increasingly unstable environmental conditions. While forestry’s demise may have been beneficial for the *Oshima tsumugi* industry during its production boom from the 1960s to 1980s, the ability to access even individual trees today is precarious, perhaps even pushing the boundaries of legality.

In November 2021, an article first published in an Amamian local newspaper found its way onto Yahoo! JAPAN news.⁸ The article explained that because of the shortage of woodcutters there is a shortage of accessible *techigi* trees in Amami, a labour issue that is ‘causing a headache’ for dyeing craftspeople and that constitutes ‘a major problem for the survival of *Oshima tsumugi*, a traditional national craft’. After its publication online, Kanai Kougei were inundated by calls (even from the neighbouring island of Tokunoshima) and visits by locals carrying logs in their vehicles, felled from their backyard, their own forests or from places where they knew *techigi* grew. It is impossible to know what propelled such a public response without recording individual motivations, but the reaction suggests that the community, like the younger craftspeople of Kanai Kougei, didn’t realize *techigi*’s ‘real worth’. The news report altered their conception of waste and value by highlighting *techigi* as a material essential to a local tradition and demonstrated the tree’s potential monetization. When the news broke, those who did know its value – the woodcutters – called the workshop to inform them that they had been ‘busted’ by their employers for selling the wood on the side. The loss of agency over the stewardship of Amami’s land and forests and the associated ecological knowledge consequently threatens the future stability of a much-treasured traditional craft that is both important to the island’s identity and economy. While the demand for traditional kimono continues to decline, the demand for contemporary textiles that are assumed to be environmentally friendly increases. The question remains whether or not a sustainable source of *techigi* can be acquired to meet this demand in the future, and, perhaps more vitally, whether this access is embedded in truly sustaining processes that entwine Amami’s environment and the lives of the island’s inhabitants.

Notes

1. ‘Tanaka-san’ is a pseudonym but at my fieldwork participants’ request all other names are real. It should also be noted that in Japan, the honourific ‘-san’ is used to show respect.
2. Kazuhito Kanai is known as *Shachō* by everyone at the workshop including his family. ‘*Shachō*’ means ‘company president’ but more colloquially translates as ‘boss’. I have therefore maintained its use throughout.
3. Between 2017 and 2018, Kanai Kougei employed three full-time and one part-time male *tsumugi* dyers aged 50–70; three full-time male apparel dyers aged 24–40; one full-time and two part-time female apparel dyers aged 24–40. Since 2019 the oldest *tsumugi* dyer has passed away, two males have been training to dye *tsumugi* yarns and all but one female has left the company.

4. Kagoshima Prefecture claims 47 tons of Amamian *techigi* are used by the *tsumugi* industry annually but does not quote its sources (2018, 123).
5. 'History of the Iwasaki Group'. <https://saiyou.iwasaki-group.jp/aboutus/history/>
6. See Prudham (2011) for an example of this in the North American context.
7. See also Knight's (1998) research with foresting families in Japan's Kii Peninsula, who asserts that while post-war forestry had become dominated by economics, 'a rich set of ideas, beliefs and associations' are attached to trees, with foresters considering their practice analogous to childrearing (1998, 197–200).
8. 'At the Oshima *tsumugi* manufacturing site, there is a shortage of collectors of the *dorozome* dye material *Sharinbai*.' [*Ōshimatsumugi seizō genba ni an'un senryō-zai sharinbai no saishu-sha ga fusoku*] *Yahoo! News*, November 28, 2021. (As of 6 April 2022, this article is no longer accessible in the UK/EU).

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