

The portable sawmill and other challenges to REDD+ in Papua New Guinea

Abstract

The future for REDD+ in Papua New Guinea (PNG) has seemed uncertain lately. Logging companies have been accessing land via a controversial legal framework called Special Agricultural Business Lease, while conservation NGOs are struggling to find schemes to stop the deforestation. After the failure of voluntary carbon trading, REDD+ has been the new favoured approach. However, there are as of yet only a few pilot projects several of which are in areas without large-scale logging. Whether REDD+ has a future in PNG is difficult to know. Chances are that it may come to share the fate of the portable sawmill – a technology previously assumed to promote sustainable community logging but now adopted by the commercial logging industry as a challenge to conservation efforts. This article argues that to understand the possibility for successfully implementing REDD+, one must look at the development of the forestry sector in the widest possible terms with the different competing actors, technologies and forms of social organisation that are employed to gain control of the species deemed valuable to either conservation or commercial resource exploitation.

Keywords: Papua New Guinea, REDD+, carbon trading, technology, conservation

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Introduction

In the remote rainforest in the southern foothills of the Torricelli Mountains in Papua New Guinea (PNG) we find the Tenkile Conservation Alliance (TCA) – an NGO set up in 2001 to protect rare species of tree-kangaroos and their habitat made famous by the popular Australian zoologist Tim Flannery (Flannery, 1998). The TCA is based in the Lumi area, where it works with 50-odd villages to protect the Scott's tree-kangaroo (locally referred to as *tenkile*), and the golden-mantled tree-kangaroo (locally referred to as *weimang*). The ultimate aim is to establish a legally recognised conservation area.¹

To achieve this, the TCA needs support from the local landowners and tries to educate them about biodiversity and local and global environmental problems. It further seeks to boost the local economy by employing locals as staff, and it initiates small-scale development initiatives such as water and sanitation projects and alternative protein farming (e.g. fish ponds, chicken and rabbit farming). The TCA has further investigated whether carbon trading or REDD+ (Reduced Emissions from Deforestation and forest Degradation)² can assist in preserving the forests, which the tree kangaroos rely on for their livelihood. REDD+ seems like a natural extension of the conservation effort, since it is based on refraining from exploiting the forest resources of the area while financially compensating locals. Hence the TCA has made workshops for its partner villages about carbon and climate change in the hope of attracting investors for a carbon trade project.

The TCA is an example of the current instrumental use of REDD+ in schemes, which have little to do with global climate change and more to do with local struggles over resource management whether for logging or for biodiversity. Yet, the transfer of policies, schemes and technologies to specific local social and political environments is always a challenge, and as argued by numerous scholars in science and technology studies as well as development studies, ‘the technical part’ is the least difficult one (Carrier and West, 2009; Randerson, 2011). REDD+ is no exception to this, and numerous studies have argued that learning from past mistakes in development (Blom et al., 2010) along with better involvement and capacity-building of multiple stakeholders from different sectors and government levels (e.g. Murdiyarso et al., 2012) is crucial to make REDD+ successful – especially vis-à-vis the ever-important challenge of access to land (e.g. Cotula and Mayers, 2009). This article discusses some of the political and technological complications, which REDD+ has been facing in PNG, and challenges that may appear.

REDD+ and other carbon trade schemes face stiff competition in PNG. The logging industry is wealthy and well organised, and the political and social landscape has historically lent itself to numerous corrupt dealings involving logging permits (see e.g. Ketan, 2000; Bird et al., 2007; Laurance et al., 2010). Conservation NGOs have long attempted to fight the battle against large-scale commercial logging by providing alternatives in terms of 'integrated conservation and development projects' (ICDPs) through education, knowledge, awareness, income-generating activities (from tourism to manufacture of non-timber forest products), and in recent years there has been a shift towards participatory and people-centred initiatives (e.g. van Helden, 2009).

Arguably REDD+ projects could learn a lot to learn from the ICDP experiences (Blom et al., 2010), and some REDD+ projects have sprung directly from ICDP (Sunderlin et al., 2014). Some of the technical challenges in establishing REDD+ are referred to as ‘leakage’, ‘perverse incentives’, ‘additionality’, ‘permanence’ and so on (see Angelsen et al., 2012), but REDD+ also faces political and socio-cultural problems that are general to development projects such as unclear land tenure situations, how to facilitate local understanding and how to gain local support for projects. These problems are also not specific to PNG (see Angelsen et al., 2012; Sunderlin et al., 2014). Yet for this paper, we will focus on the particular history of the social and political landscape of forest control and management in PNG, which has engendered its own challenges.

A technology that exemplifies some of the dilemmas facing development and conservation industries in PNG is the portable sawmill, which was thought to be promising for conservation as well as for development, when it was introduced to the country in the 1980s. Where commercial logging has been regarded as the primary agent behind deforestation and forest degradation of PNG rainforest habitats and biodiversity (Shearman et al. 2008), the portable sawmill has in contrast been promoted as fostering more sustainable forest management practices and allowing protection or even recovery of species.

However, in late 2012, people in the TCA speculated that portable sawmills were to be employed by commercial logging companies to hinder efforts of both conservation and REDD+. Our argument about the challenges to REDD+ is centred on the portable

sawmill as a form of technology, and we argue that even technologies that supposedly afford ‘sustainability’ may be co-opted by actors with conflicting interests, with unintended consequences for conservation efforts including REDD+. First we give a brief account of the recent debates over carbon trading and REDD+ in PNG, then we return to the TCA and how talk over logging companies and resources for development are enmeshed in social exchanges, and how these exchanges define the different roles and affordances of the sawmill technology.

The complications of carbon trading in PNG

As one of the founding countries of the Coalition of Rainforest Nations, PNG was a front-runner of the carbon trade initiative at the COP-11 meeting in 2005 (e.g. Lang, 2010; Babon, 2011). Here PNG was an outspoken proponent of the efforts to institutionalise REDD as a way to connect the reduction of carbon emissions with development in the Global South (Howes, 2009: 130). Environmental organisations thus expected that the high-level political interest in carbon trading would halt the unsustainable logging practices that have ridden PNG since the 1980s. The positive attitude towards carbon trading indicated a political interest in saving rainforests, but perhaps even more importantly, large sums of money were also expected to be involved in carbon trading. However, a number of complications have kept the environmentalists waiting.³

First, the way carbon trade was introduced and the way an institutional framework was set up within the national bureaucratic apparatus of PNG has hardly been conducive to the practical implementation of REDD+ projects. In 2008, following the

UN Climate Change meeting in Bali (COP 13), an Office of Climate Change and Carbon Trading (later renamed Office of Climate Change and Environmental Sustainability) was inaugurated under the then Prime Minister Sir Michael Somare with the purpose of regulating and forming a space for REDD+ research and development. This office was disbanded in 2009 due to allegations of corruption and financial mismanagement against the director (e.g. Gridneff, 2009). The current Office of Climate Change and Development (OCCD) was founded in 2010 and is the government's third attempt to establish an agency responsible for climate related work.⁴ Consultants from McKinsey took part in drawing up a 'climate compatible development strategy' in 2011, which '... identifies reduced impact logging, secondary forest management and improved management of secondary forests as providing the greatest opportunities for REDD+.' (Babon, 2011: 5). In other words, it was designed as a turn towards more sustainable forest management, which was a process that had been underway since the early 1990s (see Filer, 1997b; Filer and Wood, 2012).

Yet, despite the strategy paper the government has to the best of our knowledge still a lot of work to do in drafting and passing legislation that deals with the questions of monitoring, certification, benefit-sharing, etc. that are a necessary part of institutionalising carbon as a form of value. And with small numbers of staff and resources, the OCCD can do little but aid in the making of 'landowner awareness' in selected areas (see Filer and Wood, 2012: 669), which falls short of ensuring the institutional conditions, the necessary surveying and mapping of carbon resources, as well as carrying out consultations with the relevant resource owners (Leggett and Lovell, 2012). The slowness is partly due to a lack in political will. The politicians

have had their attention elsewhere for several different reasons – a constitutional crisis and competition over control of the government being one of the primary ones (e.g. May, 2013). Logging industry lobbying cannot be ruled out but cannot be confirmed either (see Filer, 2011: 22-23). Slowness is also partly due to bureaucratic obstacles resulting from the legislation passed in 1990s, where different acts and government bodies overlapped or came in opposition to each other in terms of authority over forest management (Filer and Wood, 2012; Babon and Gowae, 2013).⁵ PNG's Forest Authority (PNGFA) has for instance put itself in opposition to the OCCD by claiming that REDD+ was purely a forestry issue, and that consequently it should be dealt with by the PNGFA and according to the existing legislation (i.e. the Forestry Act of 1991) (see Filer, 2012: 613). The authority of the PNGFA here comes from the notion of 'additionality', which is usually a demand in REDD+ programmes and carbon trade. Additionality means that future REDD+ areas must consist of *new* (i.e. threatened) forest resources in order to qualify. This gives the PNGFA a big say due to the existing legislation on forest management giving forestry officials responsibility for forests that are not already under protection (Filer and Wood, 2012: 670). Yet, the PNGFA may not possess the technical requirements or have the capacity to deal with the social, environmental and legal implications or consequences of REDD+ projects.⁶ In fact, the PNGFA is accused of having shown little interest in reducing the rate of logging, which is their main *raison d'être*, thus giving the impression that the external funds the government has been trying to attract to support or develop REDD+ may indirectly contribute to the financing of continued deforestation (Babon and Gowae, 2013: 19). The work towards carbon trade has thus largely been spearheaded by the UN-REDD programme along with conservation NGOs like the World Wide Fund for Nature (WWF), the Wildlife Conservation

Society or the Nature Conservancy, who in REDD+ see a framework that may help them achieve their aims of conservation (ibid.).

Secondly, the potential for REDD+ in PNG has further been affected by the appearance in 2009 of so-called ‘carbon cowboys’ stirring up a ‘carbon cargo cult’ (e.g. Filer, 2012: 612). These were allegedly private sector individuals (including overseas businessmen) travelling around the country trying to persuade local landowners to sign off their land to carbon trading deals through the voluntary market. Several of them made use of certificates granted by the now disbanded head of the OCCES prior to any legislation being in place that would have allowed such certificates to be handed out, and the whole affair led to international media coverage (Filer and Wood, 2012: 669, see also Al Jazeera, 2009). Together with the scandal surrounding the government’s Office of Climate Change, the stories of scams resulted in local suspicion towards carbon trade and REDD+ activities (Babon, 2011: 4).

A third complication is the political and economic interests at stake. The logging industry is widely rumoured to have political contacts at the highest level (Ketan, 2000; Babon and Gowae, 2013: 6), and it is largely driven by Sino-Malaysian or Indonesian companies that have strong commercial interests in PNG. The largest of the logging corporations, Rimbunan Hijau, has been estimated to control approximately 60 % of the timber industry (Filer, 1997a: 212-13; Laurance et al., 2010: 2), but it also has other significant businesses such as one of the two national newspapers (*The National*) and a large newly built mall (Vision City) in Port Moresby (see Filer, 2011: 24). The majority of the raw timber felled in PNG is shipped overseas, hence providing only limited employment and income for local

communities (Laurance et al., 2010: 2). Yet, the failure of the government to provide rural communities with basic amenities such as health and education services, infrastructure and income opportunities sways locals towards the logging industry's promises of wealth and development (van Helden, 2005: 14). Moreover, the country's inadequate environmental policies and legislation is said to allow for widespread corruption within the logging industry (Ketan, 2000; Laurance et al., 2010: 2-4). Despite its promises, the shifting PNG governments have demonstrated little interest in regulating the activities of logging companies, and logging thus continues to constitute a challenge to conservation and to the livelihood of a large part of the population living in rural areas (van Helden, 2005: 12).⁷ It may be coincidental, but the year after carbon trade and REDD appeared on the national scene, a record number of logging concessions were granted.⁸ It is not implausible that on the one hand the logging industry attempted to secure as much land as possible in anticipation of legislation that never came, and that on the other hand the PNG government was deliberately trying to get the most out of the situation by provisioning for both more logging *and* REDD (cf. Filer, 2012: 611).

This leads us to a fourth complication, which is land tenure and the legislation that allows the transfer of customary land for commercial purposes. Most land – until recently a figure of 97 % was frequently cited – is held under so-called customary tenure. That is, ownership of land is recognised by the state as being embedded in networks of kinship and affinity, and as such it cannot be purchased or used as collateral since there is no individual title to the land. Neoliberal commentators have often referred to the customary tenure as the biggest hindrance to development in PNG and have advocated individualised titles so people or corporations could more

easily use land for development (e.g. Gosarevski et al., 2004). Critics from various social scientific disciplines have repudiated such suggestions arguing that customary tenure in PNG must not be mistaken for ‘communal’ ownership, and that it is far from an obstacle to development (Fingleton, 2005). Negotiating the land tenure regimes and identifying the ‘right’ landowners is nonetheless a constant challenge to conservation efforts including REDD+ (e.g. Babon and Gowae, 2013).

A recent surge in alienation of land has taken place via a controversial legal framework called Special Agricultural and Business Lease (SABL), which enables the alienation of customary land for agroforestry purposes through a ‘lease-lease back scheme’ (e.g. Filer, 2011; 2012). The SABL allows the state to lease customary land from local landowners and then lease the land back to an incorporated landowner group or to foreign investors, who promise to use the revenues from logging the forest to subsidise an agricultural development project (e.g. an oil palm plantation). Yet, often the land is apparently given to logging companies whose promises of developing an agricultural project evaporate after the forest has been cleared (Filer, 2012: 600, 615). The anthropologist Colin Filer has thus argued that today the amount of customary land because of the lease-lease back scheme may be down to 85 % since almost 5 million hectares were signed over to national and foreign entities through SABLs between 2003 and 2011 (Filer, 2011: 4-5).

In summary, the challenge of creating a proper climate change policy and thus an environment for REDD+ collides with numerous social, political and economic factors. Among them are the PNG government’s plans for economic development targeting commercial agriculture and the competing bureaucratic and legislative

structures surrounding forest management (see DNPM, 2010). Another complication is the competition between the different companies within the powerful logging industry itself (cf. Filer, 2011: 23), and then there is the conduct of political and economic relationships in general through dealings bordering on corruption, which is suspected to be one of the factors behind the recent surge in SABL-driven alienation of land (Filer, 2011). Furthermore, since the first mentioning of carbon trading for PNG, national and local political controversies have muddied the efforts to make REDD+ feasible, and the progress, mainly driven by conservation NGOs, has been slow or even stagnant.

The TCA and carbon trading

Looking more carefully at the situation in the TCA area may allow us to get a better grasp of the way the competition over forest carbon is taking place in rural areas, and how different forms of knowledge and technologies are mobilised by the competing parties.

The TCA is probably one of the smallest conservation NGOs in PNG, but perhaps because of that and the managers' presence in the area for more than 10 years, they have been fairly successful working with locals towards protecting the Tenkile and its habitat. REDD+ is not their main aim, but the managers of the TCA have envisioned that carbon – owned in abundance by the people in the Torricelli Mountains – could be a potential source of income for villagers, and it would give them a direct incentive to protect the endangered tree kangaroos and their habitat. In hope of a REDD+ project, the TCA began educating its partner villages about carbon trading and climate

change, and in collaboration with the WWF carbon plots⁹ were established on some villages' land. In 2007, the global investment banking and financial services organisation Macquarie Group approached the TCA to enter a carbon trading partnership through the voluntary market. However two years into the project, the Macquarie Group withdrew due to the unstable political situation in PNG, and the TCA and its partner villages were left waiting for another opportunity to instigate carbon trading.

The TCA villages have not given up the hope that carbon trading will earn them large amounts of money in the future though. Despite not knowing much about the technical or political dealings of carbon trading, how it would work in practice, or how it potentially would restrict customary land rights or stir up competing claims to land, people knew that the REDD+ initiative would engage them in forest conservation and that they would consequently receive payment. This was perceived as a compelling development project. The villagers were proud of their carbon, or what they thought to be their 'fresh, cool wind', which they perceived as a natural resource in line with assumed gold, oil and gas deposits (Pedersen, 2013, see also Leggett and Lovell, 2012). When the TCA paused the training sessions about carbon and climate change, the rumours and local ideas about carbon trading continued energised by hopes and expectations of another investor.

However, the classical dilemma that faces the TCA is how to convince local landowners 1) that they should trust uncertain promises about future income from carbon over certain and fast income from logging royalties, and 2) that their wildlife and nature is of value in itself and not as an expression of a relationship between them

and other actors with whom they can exchange (West, 2006). In short, why should locals want to preserve their trees for something as vague as conservation and as uncertain as REDD+ and carbon trading, when logging gives money and development (modern tools and consumer goods) here and now (Novotny, 2010)?

The short answer would be that the TCA is present locally, while logging is not (yet). The TCA does face requests for development, which includes better roads, services, money, schools, houses, cars and much else, but as mentioned in the introduction, the TCA does a lot to integrate conservation with different small-scale development projects. Some landowners in the villages neighbouring the TCA area are getting impatient while waiting for a carbon project though. Since their villages are not part of the TCA programme they have begun to look elsewhere for their share of development and are thus open towards the golden promises of logging. Since the foundation of the TCA, foreign logging companies *have* increasingly encroached upon the partner villages and the surrounding forest areas. In October 2012, a Malaysian logging company announced that they planned on logging an area southwest of the TCA's proposed conservation area. Despite none of the villages in this area being part of the TCA programme, the TCA has received multiple threats telling them not to interfere in the proposed logging project. The logging company paid some local landowners 400 Kina¹⁰ each in 'mobilisation funds'¹¹, and rumour had it that they would provide a neighbouring village with a portable sawmill so they could actively take part in logging.

A portable sawmill has in fact been desired by some the TCA landowners for years. They thought a sawmill would help them build better houses. In addition, due to rapid

population growth some neighbouring villages have become short of the typical hardwood used for houses, so people speculated that they could make a 'good business' selling timber locally. Still, no TCA villages have so far been persuaded by the logging companies, but it does seem like the loggers have become innovative in their attempts to turn the TCA's neighbours against the conservation effort. The use of a portable sawmill to serve the interest of the logging company is an interesting development in their competition with the TCA. This technology associated with sustainable logging is now allegedly employed to undermine the very efforts it was meant to underwrite.¹²

The Portable Sawmill in PNG

If we look closer at the portable sawmill and its *affordances*, we may get a better picture of how it works as a technology in relation to the hoped for capacity to promote sustainability and conservation.

By affordance we refer loosely to Donald Norman's conceptualisation (1988), which has been very influential especially in studies of interaction design and psychology but only fleetingly discussed in anthropology and related disciplines (see Were, 2013). Affordance, as we understand Norman's view, is a combination of the perceived and actual properties of a technology – a relationship between the given object's materiality and qualities on the one hand, and the perceptions, knowledge and motivations of users on the other. Regarding affordances in this light – as something not solely contingent on the materials and the intention of the maker of the technology

or object in question – the portable sawmill exhibits no predisposition, despite what some conservationists may have thought, to encourage sustainability, and introducing it may lead to unintended and unforeseen consequences to possibilities for control of forest resources and species (from trees to tree kangaroos). Its potential roles in the struggle over land and species in PNG are multiple, and these roles cannot be detached from other social, technological, legal or political infrastructures that influence forest management by providing resources and opportunities for both logging and conservation work.

The first low-cost portable sawmills were introduced to PNG by missionaries in the early 1980s with the purpose of assisting remote villages in building schools, aid posts and churches (Louman, 1996: 17). Individuals in the forest sector soon recognised the technology's commercial potential and argued that the sawmills would minimise the unsustainable harvesting of forests. It could involve local communities in entrepreneurial small-scale logging ventures, where they themselves would be in control of what was felled, where and by whom. The so-called 'wokabout sawmill', as it was named in the PNG lingua franca Tok Pisin, thus became a tool in small-scale timber production typically operated by village or kin-groups (ibid., see also Martin, 1997: 270-71).

The portable sawmill exists under different manufacturers' names (e.g. Lucas Mill; Lewisaw or the 'Wokabout Somil' by Natequip in the 1980s – Martin, 1997: 270), and it comes in different shapes, sizes and prices (e.g. www.lucasmill.com, see also Martin, 1997: 282). The sawmill is merely a metal beam on a frame with one or two perpendicular or circular blades depending on type. Thus generally being a

lightweight machine, the portable sawmill can be disassembled and carried into the forest where it is reassembled on top of felled tree trunks in order to process them (e.g. Holzknicht et al., 2012: 11). The tree is ideally felled with minimal disturbance to the surrounding trees, since no heavy equipment is needed, and it is believed that only the large commercially valuable trees are taken. In this way, the cleared area can more easily be rehabilitated, and ideally it should minimize species extinction and loss of biodiversity (Lindemalm and Rogers, 2001).¹³ Large-scale logging on the other hand requires road access that often destroys the undergrowth, and commercial loggers may fell less valuable species too.

The portable sawmill was not originally introduced as a tool for sustainable forest management or conservation. Yet, because of its characteristics, and because of the perceived needs and motivations of local communities having an interest in harvesting timber, conservation NGOs used the sawmill to explore alternatives to large-scale commercial logging and focused on developing it as a way that local landowners could control the exploitation of their forests while gaining financial returns from the harvesting and processing of their trees (Holzknicht et al., 2012: 6, 11). The portable sawmill was therefore also thought of as a technically feasible tool for landowners to manage their forest resources instead of simply selling logging rights to large-scale operations (Rogers, 2010).

The sawmill was furthermore seen as enabling entrepreneurial individuals to generate an income, and villagers were thought to become more independent and self-sufficient by being able to procure sawn wood for better houses. Greenpeace employees as well as sawmill manufacturers have argued that the portable sawmill

could earn communities returns that were four to ten times greater than the royalties paid by logging companies (*The Age*, 2006, see also Louman, 1996: 17).

Conservation NGOs thus especially in the 1990s seemed interested in incorporating the use of portable sawmills in their projects as a carefully planned and controlled form of timber harvesting. Conservation programmes and sawmill producers alike presented portable sawmilling as an environmentally friendly practice (Louman, 1996: 17), which rhetorically transformed timber into ‘eco-timber’ and forest management into ‘eco-forestry’ (Ellis, 1999: 106). Portable sawmilling would permit forest owners to become part of a global capitalist economy through ‘environmental entrepreneurship’ (Bamford, 2002: 45), and the development of a promising eco-timber industry was furthermore expected to reduce the interest in large-scale logging (e.g. Martin, 1997; Petilani, 2004).

It was in other words believed that the set of affordances embodied by the portable sawmill would generate specific types of social and economic actions, which would have positive consequences for biodiversity. It was assumed that it would make people choose sustainability over large-scale destructive logging that only provides short-term profit. Yet, critics soon recognised that the portable sawmill by no means guarantees sustainability or eco-forestry in itself. It depends on how it is used and what forms of knowledge, interests and motivations that are employed with its use (see Louman, 1996; Martin, 1997). Introducing (or ‘transferring’) technology to any social setting would inevitably entail the potential for local social changes. Even if the portable sawmill in terms of its affordances would appear to be ‘neutral’ and easy to accommodate in small kin-based social groups, there are still many reasons to be

skeptical of the promises of the sawmill because of the complicated social context in which it must operate both at the national and at the local level.

At the national level, small-scale forestry was at least up until the mid-1990s generally given low priority in PNG (Martin, 1997: 289), mainly because it has not figured large in GDP and similar statistics of economic output. While certified forestry groups were reported to have received subsidies from the EU and various NGOs and foundations in the late 1990s, they had difficulty starting up without these (Hunt 2001: viii). Furthermore, the infrastructure for small-scale forestry was and still is largely poor: ‘There is a significant gap between portable sawmillers and the market place’ (Holzknecht et al., 2012: 21). There are few middlemen, who can facilitate deals in timber, and poor infrastructure prohibits physical market access (ibid.). This consideration goes further than merely connecting villages to the outside world. It is often assumed that people will carry out the sawn timber on their shoulders, but very few people are willing to do that over long distances. For instance tractor tracks would open up larger gaps of forest than anticipated in management plans (see Martin, 1997: 274-75).

Assuming that the sawmill can be economically viable as a real alternative to large-scale logging is also contested. While some sawmill-owners have been shown to operate on a fairly commercial basis, the majority of groups have operated their mill intermittently, while also attending to other obligations from subsistence farming to recurring events such as deaths in the village (e.g. Louman, 1996: 17-18; Martin, 1997: 283-84). In other words, the portable sawmill has rarely provided the same

amount of income as commercial logging – neither to communities getting royalties, nor to the state interested in export tax on timber.

For communities to somehow benefit from portable sawmills and to utilise their full capacity, training is needed in how to operate the mills sustainably (e.g. observing rotation and regeneration cycles) along with education in safety issues and small business management (ibid.: 39, 42). With the lack of training in local communities, however, few sawmills were known to operate according to well defined management plans (Martin, 1997: 272), and there has been a risk of unregulated use of portable sawmills leading for instance to localised over-cutting of commercially valuable species including under-sized trees (Martin, 1997: 274; Hunt, 2001: ix).¹⁴ So while the portable sawmill was originally regarded as a tool for (fairly) sustainable forest management and a good alternative to industrial logging, local unregulated usage was soon recognised to be more complicated in its relation to conservation, and if the necessary conditions (support in training and marketing; social structures) were absent, it would be neither economically nor ecologically sustainable (see Louman, 1996).

What is more, the portable sawmill has also proved beneficial to the logging industry, since it allows logging at places where heavy machinery cannot reach, such as steep mountain slopes (cf. Louman, 1996: 19). It therefore seems that portable sawmilling ‘is tolerated within both of these two opposing camps [conservation NGOs vs. large-scale logging], and it can be actively endorsed and promoted by forestry officials and conservation practitioners alike’ (Ellis, 1999: 106).

When technologies are not only used for logging

When looking at the portable sawmill not merely as a piece of machinery that cuts wood, but as an *exchange object* that creates relationships between people, a different picture may emerge. 'Exchange' is understood by the anthropologists working in Melanesia to be a foundational framework for understanding how social relationships work in this region. People relate to each other through the giving and receiving of gifts (of food, wealth objects, labour etc.) at all kinds of social occasions, and in Melanesian anthropology it has even led to the theory that object-subject distinctions may not work in the same way as among Western people. Instead, persons are conceived of as being 'made' through exchange relationships and are thus as much seen as 'partible' and 'dividuals' as they are 'individuals' (Strathern, 1988).

The point is that everything in the Melanesian social world may be conceived of as constituted by exchange. This brings us back to the portable sawmill. As many scholars discussing technology have noted, a thing and the function of that thing may depend on other things, not merely the material it is made of, and how it is shaped (e.g. Norman, 1988). That is, technologies are not neutral, nor is it easy to predict how they necessarily can generate specific forms of human 'behaviour' or 'mentalities'. Technology may, as mentioned above, possess certain affordances. Through its materiality, a thing invites specific forms of use and exclude others, but apart from that, affordances are perceived and depend on the motivations, plans, values and experiences of the potential user (ibid.; Were, 2013).

It is true that the design of the portable sawmill limits the amount of trees it can cut, and the fact that it is portable removes the need to cut down everything else in order to get to the large trees. However, this depends on the assumption that the portable sawmill is only used for cutting trees. If – for instance – it is given as a gift from logging companies to local forest-owning communities, how are its affordances then relevant?

Whether the sawmills speculated to be given to some of the TCA's neighbours were really meant to be gifts, or whether they were meant to be something else is still unclear. They could have been left by a logging company for specific villagers paid by the company to use for a certain period of time under a sales and purchase agreement. This has been reported from other parts of PNG (Holzknecht et al., 2012: 59), and it could easily happen in the TCA area as well. Exchange is as mentioned a widespread framework for understanding social relations within Melanesian sociality. The point is that we here encounter another affordance of the portable sawmill. It is excellent as a gift to local communities, kin-groups or individuals, who own forests and desire to achieve 'development' for instance by getting the technological means to exploit their natural resources more effectively (i.e. more rapidly or at a larger scale).

If a sawmill was given, it is also unclear what was meant to be given in return. Access to parts of the recipients' land for the logging company to fell trees or contracts on the purchase of trees logged with the portable sawmill as suggested above? Were the portable sawmills intended by the logging company as a way to undermine the efforts of the TCA trying to introduce carbon trade or REDD+ by giving the locals the ability

to fell trees themselves, or was it groups of locals, who wanted logging in order to pressure the TCA to come forward with ‘more development’ for the villages that were peripheral to the TCA activities akin to what the REDD-literature refers to as ‘perverse incentives’ (Angelsen et al., 2012: 380)?

While the use of portable sawmills is unlikely to fell trees at the scale of commercial logging operations, their introduction may complicate the opportunities for conservation work in other ways. The portable sawmill is in terms of affordances an excellent gift in that it provides a particular agency for villagers to log their own woods but also to do so on their own terms and with their control of the social relationships needed for doing the logging. If local exploitation of timber resources thus became more flexible (with a light and movable mill), and if they grew in number, they could in turn be more difficult to regulate (Holzknecht et al., 2012). In addition, even small-scale logging may add to forest degradation, disturbance of tree kangaroo habitats and difficulties in assessing carbon stocks. Most importantly portable sawmilling could undermine conservation efforts by enabling exchange relations between a logging company and villagers.

On a final note, the sawmill may not have been given at all, but its affordance as an exchange object translates into a social space, which generates rumours that alone threaten to undermine conservation efforts.

Conclusion: exchange and participatory exploitation

The TCA is an example of how the conservation industry since the 1990s has become more oriented towards participatory measures and depends on inclusion of local stakeholders in decisions that directly affect their livelihoods. However, landowners in PNG are increasingly making demands of both conservation NGOs and logging companies playing the two out against each other (van Helden, 2009). The actors in both the logging and conservation industries make use of a variety of technological, legal or political instruments to assist them in reaching their respective goals. The portable sawmill has been one of these since the 1980s. At the moment, REDD+ is envisioned to be another instrument used by conservationists to keep logging operations at a distance by delivering financial benefits to local landowners and educating them about the environmental benefits REDD+ entails – even if the environment is hardly valued as an entity in itself detached from social relationships (see West 2006).

However, while REDD+ itself may be an obstacle to commercial logging since it involves large areas of forest land signed over for carbon sequestration, the lack of REDD+ progress in PNG and the different scandals have probably allowed the logging industry to promote itself as a certain and much faster form of development. The logging industry has benefitted from another instrument, the governments SABLs, to get access to large forest areas. The conservation industry has not made use of these SABLs or the lease-lease back mechanism, because it is generally assumed that these are given for agricultural activity (Filer, 2012: 609).

While there are examples of conservation agencies not paying enough attention to cultural and social complexities, the way they gain local support is often through

participatory means or ICDPs involving employment, education, small-scale development projects such as alternative protein farming, and training in rainforest and biodiversity protection. The question is whether the logging industry has begun to use similar participatory approaches by donating portable sawmills to local communities and educating the recipients in how to log their own forest on behalf of the logging operation. Indeed, the portable sawmill affords many forms of action. Sustainable forest management is only one of them, and it is not predetermined, which one it will be. It is not clear how REDD+ will affect conservation work or forestry in PNG should it be introduced successfully. It is still not even clear how the relevant authorities will orchestrate REDD+. So far – as shown by the portable sawmill – new technologies and other schemes have a propensity for malleability to local social and political circumstances.

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Notes

1. See www.tenkile.com. The empirical material for this article comes from a total of four months of ethnographic fieldwork by Marianne Pedersen in the Lumi area, where she worked alongside the TCA (Pedersen, 2013, see also Sullivan 2003).
2. The REDD+ scheme is driven by the UN as a way to reduce emissions from deforestation and forest degradation. It is an extension of the previous REDD scheme (without the plus), and it emerged after the climate change meeting in Bali in 2007. The ‘plus’ extension includes sustainable forest management, conservation of forests and enhancement of carbon sinks (see www.un-redd.org).
3. One could mention numerous other complications than the ones we present here – from structural phenomena to personal relationships between the individuals involved. What remains, is that very little is known of what funding – from government, speculators, international donors, ‘gullible landowners’ etc. – has fuelled the process of events. For the best overview see Colin Filer’s and Mike Wood’s work (2012: 669).
4. See <http://www.occd.gov.pg>, accessed 02/03-2014.
5. For instance regarding the policies on sustainable forest management there are overlaps between the Dept. of Planning, the Dept. of Forestry and the Dept. of Environment and Conservation. The work of these national departments may again be in opposition to the supposed decentralisation of planning to the district level, which was propagated by the 1995 Organic Law on Provincial and Local Level Government (see Filer, 1997a: 236).
6. Matthew Leggett, former WWF/OCCD, personal communication, August 2011.
7. According to Shearman et al. (2008), the expansion of subsistence agriculture (due to rapid population growth) is the other major driver of deforestation. Their conclusions have been contested though (see Filer et al., 2009), and there may be

several other direct and indirect drivers of deforestation small and large (see Babon and Gowae, 2013).

8. Matthew Leggett, former WWF/OCCD, personal communication, March 2011. We have not managed to confirm this figure, and it is not clear whether these were part of the SABL's or not.

9. Carbon plots are small areas of land in the rainforest, created so that people can measure the diameter of tree trunks to calculate the overall carbon stored in the forest area. The TCA would compare these ground facts with satellite assessments.

10. The Kina is PNG's national currency. At the time of writing (March 2014) the rate is 1 USD to 2.4 Kina.

11. Mobilisation funds are typically paid to enable the creation of awareness through the organisation of meetings for the members of the clans that form ILGs. The TCA management refers to them as bribes, but from another perspective they can be seen as part of the local gift-economy, where the mobilisation of labour and political support depends on the giving of gifts.

12. The TCA management was never against a sawmilling project as such though, since they thought it could promote sustainable harvesting of carefully selected tree species – much in line with the general affordances often ascribed to portable sawmills. However, the TCA knew that sustainable sawmilling would require substantial training and financial support, so funds were prioritised for cheaper projects.

13. It is uncertain how much the ideals of sustainable forest management are adhered to. An old estimate was that only 2 % of sawmill owners used a management plan (Louman, 1996: 18). This is something that portable sawmill advocates sometimes forget. At the very least there is need for an elaborate framework for the

communication of knowledge of forest management, but even though various forms of technical and management training has been promoted, people may still operate the machines intermittently as they see fit (see e.g. Martin, 1997: 270-72).

14. There have been attempts to sell sawmills with training packages, but in the past very few bought the training (Martin, 1997: 270-71). As a comparison, in the neighbouring Solomon Islands the operation of portable sawmills requires government-granted licence (Holzknecht et al., 2012: 55).

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