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Storytelling climate change – Causality and temporality in the REDD+ regime in Papua New Guinea

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ABSTRACT

Climate change is shaped and understood through assumptions of causality and temporality that enable and constrain feasible approaches to environmental governance, approaches that may reproduce inequalities. Reducing Emissions from Deforestation and Forest Degradation (REDD+) provides an entry point to examine the intersecting assumptions and politics around climate change and how it is managed. Actors in the REDD+ regime promote particular assumptions about the causality and temporality of climate change, which are often privileged over local ways of being and knowing. Through ten months of ethnographic fieldwork with communities implicated in the Central Suau REDD+ Pilot Project in the Milne Bay Province of Papua New Guinea (PNG), this research engages with storytelling as a methodology to investigate how people in Suau perceive and perform climate change. While people in Suau draw on a multiplicity of assumptions to make sense of complex socio-ecological change, they often foreground relational assumptions of causality and temporality. By destabilising and problematising the notion of a “common understanding” of climate change, this paper contributes to emerging work on political ontology. The ongoing privileging of categorical causal and temporal assumptions in the REDD+ regime in PNG is political – it not only places blame on subsistence agriculturalists but marginalises relational ways of seeing and addressing climate change. By telling stories, we can open up to the multiplicity of assumptions about how and why climate change is occurring and make space for alternative approaches to manage this change that may avoid reinscribing inequalities.

1. Introduction

1.1. Climate change and REDD+

Climate change is configured through complex processes that draw together a multiplicity of knowledge forms and ways of perceiving and performing reality (Hastrup, 2016: 36). To a large extent, climate change is shaped and understood through assumptions of causality and temporality. But different assumptions of why and how climate change is occurring materialise in different ways and enable or constrain different approaches to mitigation. When certain causal and temporal assumptions are foregrounded, this frames how people make decisions and execute actions (Dwyer and Minnegal, 2007: 558). It is essential, therefore, to recognise the politics at play as environmental governance interventions frame environmental problems and solutions; the act of framing itself, and the actions that result, may reproduce inequalities

(Milne and Adams, 2012: 136; Sanders et al., 2017). This paper explores ontological politics not only to critically engage with prominent forms of climate change mitigation, but also to open up to the multiplicity of ways of perceiving and enacting environmental change and to make space for alternative ways of managing such change.

The Reducing Emissions from Deforestation and Forest Degradation (REDD+) program is one mitigation mechanism that, in drawing from and reinforcing certain assumptions about the causality and temporality of climate change, also marginalises other ways of being and knowing, including those of the people implicated in such governance interventions. REDD+ is a prominent carbon market mechanism under the United Nations Framework Convention on Climate Change (UNFCCC) that places an economic value on carbon stored in trees and provides incentives for developing countries to avoid deforestation and forest degradation (Nyambura, 2016). Such an approach is grounded in particular assumptions about why and how climate change is occurring,

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largely drawn from climate science – that forests are a carbon sink, and not just a source, and thus deforestation and forest degradation increase net greenhouse gas emissions that contribute to climate change. Driven by particular actors and institutions, REDD+ governs environments by casting forest management and land use in the context of climate change and constructs new rules and norms aligning with certain assumptions but conflicting with others (Fujisaki et al., 2016: 2).

Since Papua New Guinea (PNG) and Costa Rica first proposed REDD+ to the UNFCCC at COP21 in 2005, PNG has become a proponent of REDD+ internationally and is a pilot country for UN-REDD and the World Bank's Forest Carbon Partnership Facility (FCPF). To date, the PNG government has engaged in REDD+ readiness activities, including developing institutional frameworks, organisational capacities and demonstration activities (Babon et al., 2014; Grussu et al., 2014; Filer, 2015). PNG has entered the second phase of REDD+, establishing a *National REDD+ Strategy* (GoPNG, 2017), safeguards, an investment plan and progress toward a national forest monitoring system. Government agencies have identified five proposed demonstration sites for the national REDD+ program in PNG, including the Central Suau REDD+ Pilot Project in the Milne Bay Province. This demonstration project was developed by the German aid program SPC/GIZ and initially covered 64,000 ha of lowland forest in Central Suau – stretching from Modewa to Bona Bona Island along the coast and inland to Leileiafa – an area home to approximately 7000 people from an estimated 110 clans (SPC/GIZ, 2015). The project area was originally intended to be a reduced impact logging (RIL) site but this was later revised to it being a conservation site (SPC/GIZ, 2013). Under this approach, the project frames subsistence agriculture as the leading cause of deforestation and forest degradation, and thus greenhouse gas emissions, in the area. Through analysis of the Central Suau case, this paper makes visible the assumptions around climate change that work to justify certain forms of environmental governance and marginalise other forms of knowledge and approaches to environmental management.

1.2. Storytelling

This paper engages with storytelling as an important and locally-grounded form of knowledge transmission that rejects singular accounts of reality and necessitates understandings of multiple ways of performing reality. Storytelling, we argue, may destabilise dominant ontological assumptions about climate change, including causal and temporal explanations that often obscure Indigenous ways of perceiving and performing environmental change. Storytelling provides an entry point to investigate the politics of ontology; through the performance of narratives that embody certain ideas about the world, we can see conflicting stories about 'what is there' and how reality is constituted (Blaser, 2010: 25–6; Blaser, 2013: 548). Storytelling thus offers alternative ways for reality to be perceived – stories are real (Watts, 2013). But telling stories is always a political act (Anand, 2017). While the processes through which climate change is configured may engage a multiplicity of knowledge forms (Hastrup, 2016), competing knowledge claims and the assumptions they entail shape the kind of governance approaches that are produced and promoted (Goldman et al., 2011).

While Indigenous stories of climate change may appear to be in tension with climate science, these knowledge systems tend to intersect rather than be inherently in opposition to each other. As Jacka (2016) argues, this intersection can be demonstrated by more closely examining the linkages between local knowledge, performed through oral histories, and climate data. While stories often intersect with climate science, storytelling reveals the multiplicity of assumptions around climate change and challenges the idea of a unified narrative of climate change that works to legitimise particular responses (Wickman, 2018). Indigenous scholars make important contributions to synthesising local experiences of climate change and reflecting on environmental change and human-environment relations in their own terms (see for example Simpson, 2013; Jetnil-Kijiner, 2014). In her stories of sea-level rise and

climate migration, Rakova (2012) states: "Climate change is not just about statistics. Climate change is not just about science." Climate science and Indigenous stories of socio-ecological change are not necessarily in conflict; they are just different narratives (Hastrup, 2016). Nevertheless, stories may destabilise dominant ways of framing environmental change. With that aim in mind, this paper focuses on the stories people in Suau tell of climate change, particularly in the context of the Central Suau REDD+ Pilot Project.

To begin, this paper outlines the political ontology approach and methodology used in the research process, namely storytelling and ethnography, and the conceptual frame of 'relational' and 'categorical' assumptions. Secondly, we provide background information on the Suau area to contextualise Suau stories of climate change before unpacking the causal and temporal assumptions that underpin these stories. Following this, we explore how REDD+ actors work to govern climate change and the assumptions they foreground in this process. Finally, we examine the politics of privileging some assumptions over others in climate change mitigation mechanisms. By paying attention to the negotiated and contested production of stories, and reality, in Suau, we can better understand the politics at play as environmental governance regimes attempt to enforce a 'common understanding' of climate change and, in the process, reproduce inequalities between different ways of being and knowing.

2. Approach, methodology and conceptual frame

2.1. Political ontology approach

While the so-called 'ontological turn' has been criticised for being apolitical (Vigh and Sausdal, 2014; Kohn, 2015: 316), we take politics as a central element for understanding the intersections between a multiplicity of ontological assumptions. As Blaser (2009: 11) outlines, political ontology has emerged as a field of study that focuses on the "conflicts that ensue as different worlds or ontologies strive to sustain their own existence as they interact and mingle with each other." In recognising this politics, emerging work exploring ontological multiplicity opens up other ways to engage with Indigenous conceptions of reality, particularly in relation to Indigenous peoples' knowledge of and connections to the environment (Cruikshank, 2012). This research is grounded in a storytelling approach as a way to foreground Indigenous forms of knowledge transmission. Storytelling provides both an approach and a methodology for alternative conceptions of reality and the environment to be taken seriously, as valid ways of relating to the world and not as 'unscientific,' 'superstitious' or 'backward' (Nadasdy, 2005: 291).

As storytelling is a performance, stories themselves are often messy, contested, ambiguous and highly politicised (Ernst, 1999: 88). Ingold (1993) urges that we must resist the impulse to assume that since stories are stories, they are in some sense unreal as this presupposes that there is one real reality; instead we must recognise that, "Stories help to open up the world, not to cloak it." Instead of focusing on the validity and generalizability of representations, stories disrupt the possibilities for homogeneity and generalised explanations that often emerge through governance regimes (Tsing, 1993: 125). For this study, this means that stories provide a way to open up to ontological multiplicity and recognise the politics at play as climate change mitigation interventions privilege and reproduce certain assumptions over others. Listening to stories, including origin stories and daily conversations, can help to understand what is changing and why, which is crucial for how we frame and address climate change (Crate, 2011).

Papua New Guinean scholars identify storytelling as an Indigenous methodology (Winduo, 2009: 4). Stella (2007: 40) emphasises that myths in PNG are "sacred in most cultures because they are the basis of people's ontology." Stories may articulate assumptions about the nature of existence, assumptions that may themselves be contested in the stories told by others. Throughout the country, stories are not just

personal reminiscences; they trace actions, experiences and movements of people across land which, through retelling, becomes communal knowledge (Minnegal and Dwyer, 1999: 65). They detail the interconnectedness of the environment, climate, humans and non-humans to understand processes of change, underpin claims to land and guide resource management practices (Jacka, 2015). It is the performance and politics of storytelling that is central to this paper.

2.2. Methodology

In line with this approach, the first author engaged with a storytelling methodology during ten months of ethnographic fieldwork with communities implicated in the Central Suau REDD+ Pilot Project in Milne Bay Province of PNG. The research process was initiated by consulting with local leaders – including Local Level Government (LLG) representatives, church and women's group leaders, and landowners in Suau – gauging their interest in the research and ensuring participants could give free, prior and informed consent. In this process, consent was not a one-off agreement to participate in the research, but an ongoing process of negotiating reciprocal relations between the researcher and communities. People from all positionalities of gender, age, status, education and clan were then engaged in storytelling.

The methodology of storytelling involved sharing memories and experiences, listening to monologues and engaging in an open discussion of questions, answers and mental associations (see also van Helden, 1998: 8). Storytelling was fluid and open-ended, with subjects ranging from legends about the clans and land in Suau, to stories of current experiences of climate change and environmental governance. Most storytelling was undertaken informally, on the floor of a hut or on a *hata hata* (bench) by the beach. Storytelling was always practiced in line with local custom, which involved chewing *sada* (betel nut) and providing interlocutors with food and drinks. When people felt comfortable and gave consent, stories were audio-recorded and later transcribed. Most stories were shared in English, but some included Suau language, namely the Lausaha dialect. By being part of daily storytelling performances, the first author gained insights into the lives of people in Suau, how they perceive and perform reality and transmit knowledge. Nonetheless, her presence in facilitating storytelling influenced the performance of stories; these cannot be extracted from the context in which and audience for which they were performed. Further, our understandings of those performances will always be partial and situated in our privileged positions as *dim dim* (white person) outsiders. When presenting these stories below, where the first-person pronoun is used it refers to the lead author.

In addition to storytelling methods, the first author conducted two months of ethnography with key REDD+ institutions in the national capital Port Moresby and provincial capital Alotau. Through semi-structured interviews, observation and policy analysis, this part of the research investigated how institutional actors involved in the REDD+ program in PNG frame climate change and adopt certain assumptions to legitimise forms of environmental governance. Together, the storytelling in Suau and ethnography within institutions reveal the multiplicity of assumptions about the causality and temporality of climate change that intersect in the REDD+ regime in PNG.

2.3. Relational and categorical conceptual frame

In analysing both sets of ethnographic material, we distinguish between 'relational' and 'categorical' assumptions of environmental change and governance. Relational assumptions foreground modes of relationship as more salient than the entities or categories that are defined in terms of those relationships; while categorical assumptions give primacy to categories and see relations as derivative from interaction between pre-existing entities. This distinction, however, remains a heuristic device to guide analysis of complex understandings of socio-ecological change, and should not be mistaken as describing different

knowledge systems.¹ Relational and categorical assumptions are not mutually exclusive; indeed, arguably they are co-constitutive, in the sense that entities can only be known through the ways they can be juxtaposed while relationships can only be recognised through the entities they connect. But attention may be directed to certain kinds of assumptions about the causality and temporality of climate change rather than others, attention that may shift through time.

It is the politics of this process of privileging that we focus on. When relations are foregrounded, causality becomes fluid and contextual since relations are always in the making (Blaser, 2010: 114). Time is experienced through relationships and interactions with the world, rather than in reference to pre-existing categories (Minnegal, 2009: 90). Where categories are foregrounded, causality is focused on entities and temporality is seen as an external, 'real' phenomenon structuring reality into linear and chronological units and scales. In Suau, people draw on both relational and categorical assumptions of causality and temporality, but typically foreground relational ways of being and knowing; for them, the relations between entities generally are more salient than attributes of the entities themselves, when deciding how to act. This becomes important for understanding how people perceive and perform climate change and how they engage with the Central Suau REDD+ Pilot Project.

3. Suau stories of climate change

The Suau area covers the south-western corner of the Milne Bay Province in PNG and is part of the Massim cultural group. As in other coastal areas of Milne Bay, land in Suau is matrilineal – that is land is passed through the female line, though first-born sons typically act as Principle Landowners (PLOs) in speaking for their mother's land. In Suau, people do not possess land, but belong to and orchestrate on behalf of land; rights and roles to act on land are always negotiable (Demian, 2003: 34). Land is intimately connected to life and death – most deaths in Suau are attributed to sorcery, which is often the result of land disputes or jealousy over people having too much land. The majority of households practice swidden cultivation with periods of clearing, burning, planting, harvesting and fallow, and rely on garden staples – yam, taro, tapioca, sweet potato and bananas – as well as cash crops – sago, coconut and betel nut – for their living. Gardening is important not only for livelihoods, however, but also for establishing claims to land.

The Suau coast has a complex colonial history and experienced a concentrated period of missionisation through the first phase of that (Dickson-Waiko, 2001). The introduction of Christianity involved moving away from a history of violence, cannibalism and the worship of ancestors and spirits towards new religious and economic obligations (Demian, 2013: 32). In addition to missionisation, PNG endured three successive colonial states from the late 19th Century – including protectorates under Germany, Britain and Australia – before reaching Independence in 1975. In Suau, the colonial administration established waged-labour on rubber and copra plantations (Demian, 2006: 521) and moved villages closer to station centres (Demian, 2004), which has contributed to high rates of land disputes in the area. Resource extraction has also been part of the 'development' of Suau. Eastern and Western parts of Suau have experienced logging in the past and, as depicted in Fig. 1, the New Britain Palm Oil (NBPOL) company also has large palm oil plantations in Suau, which provides some employment opportunities. Emerging climate change mitigation interventions in Suau intersect with these historical processes and ongoing forms of

¹ Indeed, there are other conceptual frames which could be adopted in such an analysis for example, Gell's (1992) 'A-series' and 'B-series' time (see also Ingold, 1993), Munn's (1992) distinctions between 'atomistic' units of time and conceptions of 'motion' or 'flux' as well as Descola's (2013) construct of 'interiority/exteriority.'



Fig. 1. Map of the Central Suau area including an outline of the Central Suau REDD+ Pilot Project.

resource extraction.

It is within this context that local people are perceiving and performing climate change and environmental governance. After arriving in Suau in March 2017, the lead author quickly realised the extent to which people in Suau discuss climate change in everyday practices of storytelling. The (English) terminology of ‘climate change’ is used frequently, often when discussing the weather and changes in the garden. During a storytelling session, a former councillor emphasised, “Climate change is my concern today. Very, very big concern to me today.” He added, “[Now] you feel the heat of the sun, it’s very hot. Not like our old time, we call it peace time. Now it is very hot. You can feel, you must experience it through your body, that it is hot today.” These sentiments were shared by others and elaborated in different ways. Often climate change was linked to the origin stories of different clans, which explain the relations between people, land and the environment over time. People in Suau tell stories to make sense of complex processes of socio-ecological change, which they are currently experiencing.

People on Suau Island have an origin story about tulip trees (*Gnetum gnemon*), which links people to place and explains why everywhere on the island there are tulip trees with edible flowers (*busso*) and nuts (*ega ega*). One morning I was storying with Serah, whose father is from Suau Island. The day before she had gone looking for *busso*, little green flowers that are often cooked with chestnuts; *busso* only last for a few weeks each year, so people turn to harvesting them as soon as they appear. It was the season for these flowers to blossom, but this year they had not yet appeared as expected. Serah explained, “Usually *busso* flower before the *ega ega*, but now climate change is making everything out of order.” This interaction with Serah is just one example of the ways people in Suau perceive and perform climate change on a daily basis. People in Suau have origin stories that explain human environment relations, but they also discuss climate change in everyday practices of storytelling.

In 2017, people in Silosilo experienced months of unprecedented high tides, which came up under the houses in the coastal village. Elders recounted that the sea level has risen, mangroves have fallen over and the channel that separates the village has grown wider; one noted, “The waves are taking the land away. Before the land is some metres away from the sea, but now it’s like digging away the soil and the sea level is coming close.... We can see coconut trees and some other big trees are out in the sea, so that makes it like the climate is changing.” People

expressed fear of the rising sea level, but also uncertainty about what this event meant more generally for their lives. Bush material houses are usually built near the mangroves or coastline, partly because the presence of people on the land near the coast is thought to keep the sea level at bay. If houses are built further inland, or on higher ground, people believe that the seas will continue to encroach on their land unabated. And yet, while most people continue to live in houses along the coast, some have moved to permanent houses more inland. They moved due to loss of land, but they and others perceive that moving will exacerbate loss of land. Already, climate change is impacting on the ways people in Suau relate to, and live on, their land.

In addition to sharing stories of high tides and rising sea levels, people also frequently spoke about changing rainfall patterns. Usually January and February are dry months for the area, but in 2017 there was high rainfall through those months. These changes were most often discussed in relation to the gardens. A local woman Aana explained, “In the gardens, the seasons have changed. The rain patterns change. Like before we have certain times where it’s like we experience rain. But because of this change in the climate, sometimes the rain falls at times where we don’t expect it.” During garden walks, people would often express sentiments like, “Climate change really has a lot of effect here, the sun’s heat has never been as strong as this.” The hot sun is blamed for the taro leaves dying, which has not happened previously in this area, and for reduced crop yields. Reduced crop yields can be attributed to a number of factors – including soil depletion, pests and intensified use by more people – but it is notable that people in Suau are increasingly linking this to climate change. While we acknowledge that such comments may reflect a certain bias towards the ‘good old days,’ this does not undermine the fact that people in Suau see these changes as unprecedented. For example, women noted that in previous times “we have plenty and big” coconuts, whereas now there are less coconuts available and some of them are growing without juice inside. This is an unusual phenomenon, they said, not experienced in this area before.

To a considerable extent, the observations and predictions of climate science accord with these stories. Warming trends have been observed in both annual and half-year air temperatures in PNG since 1943 and 1962 respectively, just as mean sea level is projected to continue to rise over the course of the 21st Century (Australian Bureau of Meteorology and CSIRO, 2014). Average rainfall is expected to increase alongside the intensity and frequency of days of extreme rainfall, but the incidence of

drought is projected to decrease (Australian Bureau of Meteorology and CSIRO, 2014). Yet the stories told by climate scientists foreground different things to those told in Suau. People in Suau negotiate different assumptions about the causality and temporality of climate change, which we discuss in the following sections.

4. Causality of climate change – “It’s not like *dim dim* theory on climate change”

Clans in Silosilo have an origin story named after a being called Kakotilotilo, a name taken from the oysters (*tilotilo*) in Silosilo bay; this story links people to place and explains the emergence of the environmental features in the area. The core moral of this story is that people and the environment are connected, that non-human forces and custom work to protect these relations, and that breaking custom leads to environmental destruction and death. When discussing climate change, people in Silosilo often return to the origin story of Kakotilotilo and remark that people “do not respect custom, so changes are happening – people’s carelessness is causing climate change.”

One day Aana and I had gone up to the big river in Silosilo to wash, along with her six-year old daughter Lily. In line with the story of Kakotilotilo, people are not meant to hunt eels or crabs in this river – these non-human beings are the true owners of the river and Kakotilotilo protects them – as killing them will cause storms and environmental destruction. When we reached the river, there were two large frogs sitting on the bank and Lily promptly began to throw rocks and yell at them to go away. Aana scolded her, not for throwing rocks, but for talking to the frogs as if they were humans. She explained that if you talk to animals like to humans it will cause “big thunder and lightning.” The boundaries between humans and non-humans are always shifting and you need to carefully negotiate these relations, otherwise changes in the environment will bring destruction. Aana elaborated on this:

“Before they have leaders who believe in custom and they use those powers to control the nature, or so, because of those beliefs. Today we carelessly, we are just like living. Not following the custom beliefs and all that, that also destroys the environment. People are careless. ... Like before when there are big water eels and whatever in the rivers, they said don’t destroy them. Because when you destroy them, they believe these people [the eels] own this river or they say, this is their place. When you destroy them, you sort of make them angry and you cause big floods and you cause erosion and all this stuff. Those were beliefs which people respect the environment and what is in it, like to keep it intact or something. Today, the new generation just live very carelessly and destroy the environment. And partly we contribute to the changes in the environment, our carelessness.”

Breaking custom was commonly referred to as a cause of climate change in Suau. Recognising that the environment itself plays a reactive role in causing change helps to shape our understanding of these stories (Jacka, 2015: 17). Mari, a mother of five who is married into Silosilo, shared similar sentiments: “Nowadays, the new generation we don’t respect some of the customs that people follow before. That’s why maybe that brings the changes, some of the changes.” A leader from Fife Bay articulated this relational causality of climate change, which is fluid and contextual:

“Basically, it’s all about not caring for yourself and your environment because our lives depend heavily on the place in which we are born, the mountains and the sea. When the land is washed away, it is basically because you have not cared for the beaches, that is why the waves come up. ... The second thing is that we have an attitude problem; the tree has done no harm to your life, but you take a big action to the tree – that tree has stood there for a hundred years, but you came to put it off [cut it down]. ... So, in other words, you are assaulting, you are murdering, you are destroying nature. ... Today,

nature has not respected us because we have not respected nature. ... Because of our poor relationship, we say that there is a problem. There has never been a problem, the problem starts with you and I not respecting the nature, on the climate change in the area.”

As this quote reveals, people in Suau foreground relationships with nature when attributing the causes of climate change. While recognising that changes in the climate are anthropogenic, people in Suau rarely attribute responsibility to industrialised countries or corporations. Discussing these changes, Kere, a youth leader in the church, pronounced, “It’s not like *dim dim* [white people] theory on climate change.” In discussing *dim dim* theory, Kere was making reference to ideas introduced by REDD+ proponents as part of the feasibility studies for the Central Suau REDD+ Pilot Project. A number of ‘awareness’ meetings and workshops were held in villages in Suau, and in Alotau and Port Moresby, to explain climate change and REDD+. Kere distinguished between the ways he experiences changes in the environment and the ways that visiting REDD+ teams talked about climate science, greenhouse gas emissions and carbon. These stories thus disrupt singular and generalised narratives of the causes of climate change.

Similarly, Lipset’s (2013) work on how people in PNG conceptualise the impacts of climate change found that Murik people, both cosmopolitan and rural, connect rising sea levels to climate change, but do not see these changes in terms of human rights violations or actions by states or corporations. For Murik people, rising sea levels and storm events are not framed in terms of scientific or climate justice discourses, but signify, and are saturated, by the social (Lipset, 2011). Smith (2018) also notes narratives of self-blame among the Pala’wan in the Philippines. This self-blame amongst subsistence agriculturalists confronts scientific notions of the causality of climate change, but these narratives also reveal the deeper assumptions at play about the relations between people and the environment. That local people may blame themselves for destructive changes in their environment does not diminish the responsibility of developed countries, corporations or consumption patterns for their role in causing climate change. Rather, these stories highlight how Indigenous people typically conceptualise the causes of such change in terms of a breakdown in relations between humans and the environment.

While some assumptions about the causes of climate change promoted during REDD+ awareness campaigns have been incorporated into local understandings of climate change, relationships continue to be foregrounded. It is not so much the case that external organisations impose their views on local peoples, but that local peoples negotiate a multiplicity of assumptions within their own positionalities and across different contexts. Ryan, who studied forestry at a college in Lae and was part of the REDD+ awareness teams, reasoned that climate change was occurring, “Because of our great harvest of the loggings and whatsoever, big trees and great gardens and whatsoever. ... It’s very hot. It’s caused by loggings and [cutting] big gardens, chopping down of big timber, [cutting] trees down.” And yet, in adopting the assumption that climate change is caused by deforestation and forest degradation, Ryan still emphasised people’s relations to trees when explaining this logging:

“Sometimes they select those big trees, our old grannies, they select those trees for them to go and sit down when there is sun time or something. They said they feel that that is the special tree that is providing air to us. Today, they are destroyed. They are harvested through logging or even gardening. Because people believe on their subsistence farming, so they want good land to plant *kai kai* [food] so they are destroying those important trees. But in our old times they preserve the trees that they name. Like rosewood today and kwilla today, those are special trees to us. ... They are now harvested.”

These stories demonstrate the intersecting assumptions at play around the causality of climate change. While in origin stories and everyday practices of storytelling people frame climate change through relational causality, they may also draw on categorical assumptions, particularly in the context of the Central Suau REDD+ Pilot Project. By

recognising that relational and categorical assumptions are co-existing potentialities, we can examine how some people, in some circumstances, chose to prioritise either relations or categories and consider the politics this entails (Minnegal and Dwyer, 2017: 252). This demonstrates how storytelling is political – some people, in some settings, choose to foreground certain assumptions of causality over others, as Ryan did. Negotiation and contestation are important elements of storytelling in Suau, but these practices are often closed down within climate change mitigation programs such as REDD+ where scientific assumptions may preclude alternative ways of being and knowing. By engaging with storytelling, we can remain open to multiplicity and recognise the politics at play as certain assumptions are foregrounded over others.

An analysis of the causality of climate change in Suau would be incomplete without a discussion of temporality. In Suau, as in most places, there are strong connections between causality and temporality; causal events are understood through temporal schemes which connect the past, present and future (Demian, 2003: 35). An account of the teachings and principles of Reverend Lusa Anere – a prominent figure in Suau – emphasised that, “Causes and effects spread across space and time. And depending on their vivacity, in whatever and time and place, can lead to either new causes or effects. In time and space alone, the principle of cause and effect are most profound and the two are inseparable” (Anere, 1991: 14). Here temporality is not chronology (regular systems of dated time intervals in which events are said to have taken place) nor history (a series of events which may be dated in accordance to chronological interval) (Ingold, 1993: 157), but entails a perspective that is fundamentally connected to causal relations. The next section will discuss how people in Suau negotiate a multiplicity of temporalities to make sense of climate change.

5. Temporality of climate change – “You *dim dims* have time, we do not”

One afternoon in Silosilo I was sitting and storying with the aunts and Silas, a hard-working gardener with a quick sense of humour. We heard a bird calling in the forest and Silas jumped up and described this special bird, “When this bird calls, it is a signal that the tide is changing.” He added that people in Suau call this bird, the ‘Harbour Master.’ I was amazed to hear of this bird and how its call indicated an awareness of temporality and change in the environment. But the aunts promptly began laughing at Silas’ joke on the naïve visitor. For the rest of my time in Silosilo, people called Silas the ‘Harbour Master.’ However, his joke was not entirely without truth. People do indeed use the calls of birds as a sign of temporality in Suau. The bird Silas mentioned is called Kolobi and its cry does give people the time. Mari explained, “Kolobi too used to cry, that bird’s name is Kolobi. They cry and give us time. We don’t have time before – these things give us time. ... Some they hear from the birds, you know. Birds give them signs, like *debole sayma* [high tide] or *margoan teewah* [low tide].” In this quote, Mari is expressing that before people had relations with the birds, there was no time – that by listening to the cries of birds’ people could follow the times of the tides.

Despite these inklings of temporality, Uncle Mosi, one of the elders in the village, repeatedly insisted, “You *dim dims* have time, we do not.” When discussing this, Kere also said to me, “You *dim dims* have a time to eat, to sleep, to work, but here there is no time.” Here Kere is drawing a distinction between categorical time and the ways that people in Suau experience temporality. Rather than accepting that in Suau there is no time, I came to realise that people operate within a multiplicity of temporalities. Moreover, their underlying assumptions about temporality are different from those underlying what they term ‘*dim dim* time.’ Instead of time being an external, linear and categorical measurement of reality, time in Suau is largely relational.

Through colonisation, missionisation and ongoing engagement with development and extractive industries, people in Suau have had extended exposure to categorical time-keeping and frequently use months and days of the week, for example, to define time. Authority

over the chronological definition of time under colonisation and missionisation not only works to control aspects of everyday life, but connects this level of control to broader governance regimes (Munn, 1992: 109). While colonial administrators attempted to control villagers’ utilisation of time in PNG – through the introduction of the clock, calendar and schedules – they did not manage to dominate or eradicate relational temporality (Dalsgaard, 2013), which is still foregrounded in Suau. Christian missionaries attempted to impose linear assumptions of time (Fabian, 2014: 2), separated from human-environment relations, and while this categorical frame of time has become dominant it has not entirely absorbed other ways of enacting temporality.

For most people in Suau, time is revealed through the birds, trees and winds. Mari summarised how people see time, “They see through plants, through the wind blowing and through the rains and, also, this hot, dry season.” It is the relations between people and the environment that matter in terms of temporality. Ryan elaborated, “Some of the trees they see the leaves or whatsoever the stems grow down, that indicates to them that the season will change this way, this way. This is time for harvest, time for fish, it is always the tree that will indicate [to] us.” The rosewood tree, for example, tells people the seasons in the garden; when it blooms, it is time for the crops in the garden to grow and for people to plant new seeds and when its leaves turn yellow, people go fishing for tuna. The badila tree also signals a time for fishing; when its leaves turn red, people can catch red emperor fish. The changing directions and strengths of the wind also mark a change in season. People in Suau distinguish between *yalasi* (a strong, southerly wind), *alo’wabu* (a northerly wind which coincides with very low tides), *yawahno* (harvest time which coincides with a light wind) and *wai’yahu* (dry season). Recognising and observing these seasons depends on people’s close engagement with their environments, rather than the linear progression of categorical seasons.

Within this relational temporality, climate change is making time in Suau less predictable. In Silosilo people would often say to me, “Now time doesn’t work out.” A local Pastor noted that it is like time is “fading away, like what you expect won’t be to your expectations.” Pearse, a principal land owner and highly-respected leader, recalled, “Before, in the time of the *babus* [grandparents], tides were their calendar and seasons. Now this isn’t working like before. The tides don’t follow the same patterns. The same is happening with the gardens and the times for planting.” Crucially, people often attribute these changes to “climate change.”

Because people in Suau are so entangled with the production of time through their relations with the environment and climate, there is a growing sense that things are not as they were before and that this is bringing new hardships for people, particularly in the garden. A community leader from Kau Kau expressed these sentiments:

“In the olden times, the climate has a pattern, or it has where it falls. ... But nowadays we don’t have those patterns anymore. Everything is changed. We have certain seasons, like especially with the garden crops; now the seasons have changed too. When we come to that time we are expecting our certain garden food, which is time for it, it doesn’t work out, it won’t bear. So that’s where our people, especially the old people, usually tell us now we don’t have proper seasons for our place because of climate change. We have a very big problem, especially with the garden crops. Sometimes we have certain food which we plant and then harvest that at that time and then we are going to have a good harvest, but when we plant it, it doesn’t work out because of climate change.”

Sometimes these changes are discussed in terms of categorical temporality; for instance, the Pastor went on to reference seasons and months when talking about climate change:

“Okay like we do have seasons. When it is time for summer, it’s time for summer. When it’s time for winter, it’s time for winter. But now at this moment here, when it’s time for summer it doesn’t look like

summer, it looks like winter all the way. So when we have rain, because we have seasons like June and July we have rainy season. So people know that June and July it is time for rain. But then sometimes it rains, sometimes it can rain the whole year.”

As this quote demonstrates, people in Suau draw on different assumptions of temporality to make sense of climate change. In addition to framing the temporality of climate change as relational – that is, perceived and performed through people’s relations with their environment – people also use categories of time, like seasons and months, to track changes in the environment. Temporalities of climate change are always emergent, never stable, and qualified through interactions with human sociality (Salazar, 2018: 37). Whether Indigenous people frame climate change in terms of Western calendar months, or other understandings of temporality, they still recognise that climate change is disturbing temporality (see also Smith, 2018: 271–2). And crucially, people in Suau often perceive and perform climate change through relational temporalities; it is their relationships with the environment that define changes in weather patterns and the garden. In this light, climate change is disrupting relations with the environment, destabilising time and making the world less predictable.

6. Causality and temporality in the REDD+ regime in PNG

Like people in Suau, REDD+ proponents foreground certain assumptions of the causality and temporality of climate change to justify their approach to environmental governance. These assumptions are reflected in the narratives promoted during REDD+ and climate change awareness programs in villages in Suau, but also in the policy documents and strategies adopted to govern the environment. The forestry department’s priorities for climate change include mitigating greenhouse gas emissions, as well as improving understandings of both forestry and climate change, and promoting education and awareness (Amos, 2013: 11). The PNG government’s Vision 2050 insists, “There is poor understanding of climate change and variability and hence inadequate adaptation and mitigation measures currently in place in the country” (National Planning Committee, 2010: 41). Attempts to address this have involved climate change awareness programs, including as part of the Central Suau REDD+ Pilot Project, which presented greenhouse gas

emissions, deforestation and forest degradation as the causes of climate change.

To a large extent, the institutions and policies behind REDD+ in PNG give precedence to entities and categories – namely greenhouse gas emissions, mitigation targets and limits – in their framing of the causes of climate change. For instance, PNG’s National REDD+ Strategy (GoPNG, 2017: viii) attributes the rise in global temperatures to greenhouse gas emissions. But in saying this, the actual source of emissions is anonymised. It is commonly asserted that over 95 percent of greenhouse gas emissions in PNG come from land use, land use change and forestry (LULUCF). The national Climate Change and Development Strategy projects that greenhouse gas emissions will increase by 40 percent by 2030 if current deforestation rates continue (Babon and Gowae, 2013), but these categories, again, are defined without reference to the people or processes involved. The country’s Readiness Preparation Proposal (R-PP) for REDD+ under the Forest Carbon Partnership Facility (FCPF, 2013: 6) is centred on addressing climate change by mitigating these greenhouse gas emissions from deforestation, while maintaining economic development. As depicted in Figs. 2 and 3, taken from REDD+ promotional material presented at conferences and workshops by PNG government agencies, climate change is commonly assumed to be caused by greenhouse gas emissions from LULUCF. In these images, emissions are categorised according to cause and quantified into percentages. These generalised cause-and-effect statements have effectively become ‘laws’ in climate change mitigation (Forsyth, 2011), but in practice these categorical assumptions are highly problematic.

These assumptions have translated into the Central Suau REDD+ Pilot Project, where the emphasis on the certification of emissions reductions (SPC/GIZ, 2013: 9) shows how categorical assumptions of carbon and accounting have become divorced from the different relations and contexts in which emissions are produced (see also Dalsgaard, 2016). In the design of REDD+ projects, small-scale subsistence agriculture is typically identified as the most significant cause of deforestation (Nathan and Pasgaard, 2017). This is certainly true in the case of the Central Suau REDD+ Pilot Project, where ‘agricultural land expansion for subsistence’ is identified as the number one driver of deforestation and forest degradation in the area (SPC/GIZ, 2014: 15). Unsurprisingly, however, the project design documents do not

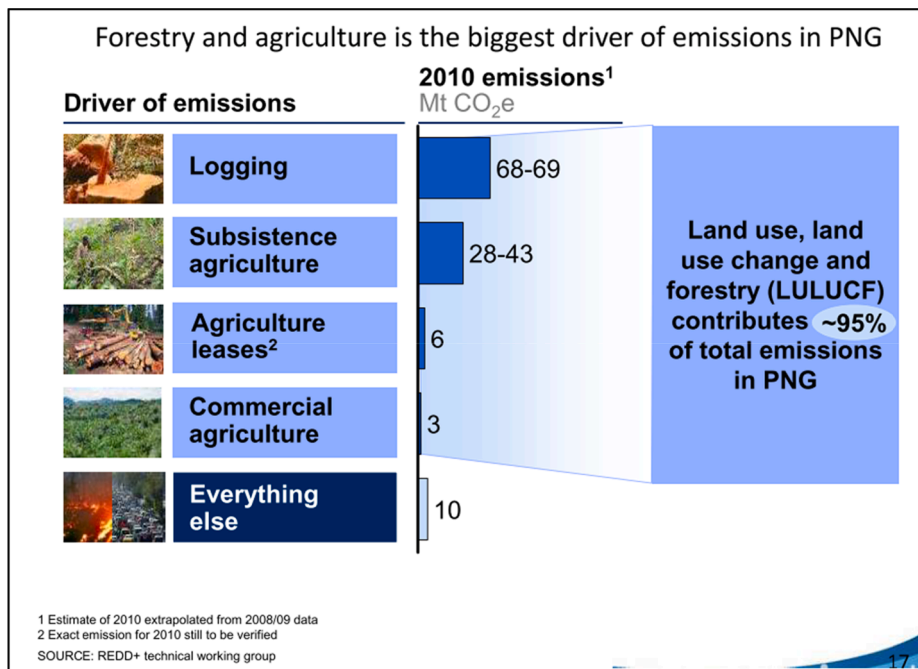


Fig. 2. Image from a presentation on PNG’s REDD+ program at the 22nd Asia-Pacific Seminar on Climate Change (Pokana, 2013).



Fig. 3. Image from National REDD+ Awareness Raising Workshop (Amos, 2013).

thoroughly consider the complex relations between people, land, forests, livelihoods and land use in Suau. Similarly, Eilenberg (2015) has observed how the design of REDD+ projects in Kalimantan, Indonesia does not fit with local realities, and Pasgaard (2015) has highlighted the disconnects and politics between REDD+ proponents and local forest management committees in Cambodia. Across South-East Asia, REDD+ is intersecting with customary land tenure systems and complex political economic struggles over land and forest resources (Dressler et al., 2012); as such, the assumptions of the causality of climate change underpinning such projects needs to be understood in this context.

In addition to these assumptions of causality, the institutions and policies behind climate change mitigation interventions like REDD+ largely foreground categorical assumptions of temporality. It is often taken for granted that the ontology of time is linear and disembedded from human-environment relations (Krøijer, 2015: 13). This privileging of categorical time was noted in the REDD+ policies, strategies and project design documents in PNG and the Central Suau REDD+ Pilot Project. The *National REDD+ Strategy*, for example, draws on chronological, long-scale time frames when measuring and projecting climate change. The strategy states, “Average temperatures have increased by 0.6 °C over the past 60 years and could rise by 1 °C from 1990 by 2030, while sea level could increase by 1.5 cm over the same time period” (GoPNG, 2017: viii). These long-term, linear timeframes have also been promoted in education programs for the Central Suau REDD+ Pilot Project; for example, during community awareness sessions on climate change villagers were shown graphs depicting emissions and warming over time. The feasibility study for the Central Suau REDD+ Pilot Project also emphasises categorical temporality:

“A 35-year cutting cycle is used in PNG and implies that each year an area of roughly 965 ha will be logged and left to regenerate for 35 years. Both stand regrowth (emission sink) and mortality (emission source) will continue for years after logging; as such, these sources and sinks in each annual logging compartment have been accounted for in a cumulative manner.” (SPC/GIZ, 2013: 26).

Rather than seeing deforestation in terms of relations between people, livelihoods, forests and land, the project design documents emphasise specific linear timeframes, namely a 35-year cutting cycle

and blocked concessions of regeneration. This emphasis on fixed periods of time (and space), such as annual logging compartments, does not take into account changes in relations between people and their environments over time, nor does it consider other temporalities. Nevertheless, these assumptions of causality and temporality have become embedded in policy-making processes in PNG and are reinforced through the design, implementation and evaluation of REDD+ projects.

Broadly, however, the kinds of empirical material compared here – orally told stories from Suau and written policy documents from PNG’s REDD+ program – clearly also influence how assumptions are identified and analysed. The performance of stories in Suau is a political process, open to contestation. Likewise, the production of policy documents is imbued with politics, but this is less visible in the final products analysed in this paper. During ethnography with the key REDD+ institutions in PNG, a more nuanced picture of climate change emerges in relation to these policy documents. One actor emphasised, “You can have your policies, you can have your legislations, you can have everything in place – but did you really consider the people on the ground?” While stressing the need for real, tangible awareness about climate change, REDD+ proponents argued for a “common understanding of climate change” in terms of PNG’s policies and legislation. Given the different orientations identified above, this focus on a common vision of climate change suggests that certain assumptions may be foregrounded or marginalised within the REDD+ program in PNG. The following section discusses the politics of prioritising, and institutionalising, some assumptions over others.

7. Discussion and conclusion

The institutions governing REDD+ in PNG, and their policies, have promoted a “common understanding” of climate change – an understanding largely grounded in categorical assumptions of causality and temporality and drawing authority from climate science. However, as we have seen in the Central Suau REDD+ Pilot Project, people caught up in climate change mitigation interventions negotiate a multiplicity of intersecting assumptions about how and why climate change is occurring. In this light, the privileging of certain assumptions over others, and the politics of this foregrounding and marginalising, works to enable and

constrain different approaches to environmental governance. When one's starting point is categorical, punctual, measurable assumptions of climate change, this denies other, relational and fluid assumptions (see also [Simonetti and Ingold, 2018](#)), but it also shapes how environmental problems are managed and may reproduce inequalities in the process. This has consequences for the lived realities of people in Suau – inequalities between different ways of being and knowing have implications for livelihoods and the ways people perform their realities.

Science plays an important role in 'objectifying' climate change and closing down negotiation and discussions of alternative assumptions (see also [Berling, 2011](#)). Assumptions from climate science – in this case, assumptions embedded in policy making in PNG, such as statistics on greenhouse gas emissions from LULUCF and projected temperature increases over time – are used to justify approaches like REDD+ to governing climate change. In this sense, climate science is not just a claim to knowledge, but also a political economic system for resource control which can silence competing claims. While the production of scientific knowledge usually is seen as separate from politics ([Goldman et al., 2011](#)), climate science is used for political purposes. To see the world with a singular vision, climate science is often forced to fortify categories and shore up boundaries ([Tsing, 2005: 81](#)). By recognising that scientific knowledge is not monistic, we can open up to other ways of conceiving, and addressing, climate change ([Hastrup, 2016: 40](#)).

By exploring Suau stories of climate change, this paper has offered a glimpse of different assumptions. Through stories, we can see the politics at play as certain assumptions are reified and used to legitimise approaches to environmental governance, approaches that have impacts on the lives of those implicated. Suau people typically foreground their relations with the environment when making sense of climate change, but the assumptions promoted by REDD+ institutions and policies do not acknowledge these relational ways of being and knowing. The dominance of categorical frames of temporality, which are linear and unaffected by an observer's place in time, have become so powerful that they may obscure other ways of enacting time ([Fabian, 2014](#)). The foregrounding of categorical assumptions of the causality and temporality of climate change marginalises the understandings that people derive from their lived, everyday relations in the world (see also [Ingold, 1993: 152](#)). This shift in emphasis from relational to categorical temporality is political – it has to do with the construction of governance regimes that embed people in a 'wider constructed universe of power' ([Munn, 1992: 109](#)).

This is not to say that relational assumptions are in any way morally superior, or better able to capture reality, in comparison to categorical assumptions ([Holbraad and Pedersen, 2017: 119](#)). In recognising the intersections between different kinds of assumptions about the nature of reality, and in this case climate change, the task is not to draw a binary opposition between different ways of knowing but to investigate how certain assumptions may be privileged over others in different contexts. Such assumptions never operate in isolation and are instead mutually-constitutive. Therefore, it is important to examine the politics at play as some assumptions are foregrounded and others marginalised. As we have seen in Suau, and as is common in other REDD+ programs, the privileging of assumptions involves a cyclical process where assumptions drawn from climate science enable certain approaches to environmental governance – approaches that, in turn, reinforce the initial assumptions and exclude others. Policy-making processes around climate change in PNG, like elsewhere, reify these assumptions in the ways that projects are designed, implemented and evaluated, but the politics of this process is often ignored.

The privileging of categorical assumptions often fails to acknowledge that these are embedded in political economic contexts and historical processes of colonialism. Assumptions drawn from climate science are seemingly detached from human-environmental relations and power dynamics ([Brosius, 1999: 281](#); [Li, 2007](#)). The foregrounding of simplified, anonymised assumptions of causality – that subsistence agriculture emits greenhouse gases and thus causes climate change – is a political

act that works to legitimise particular approaches to governing climate change, namely market-based mechanisms like REDD+. By placing blame on subsistence agriculturalists, these assumptions obscure the role of economic systems and markets in driving greenhouse gas emissions. This is not unique to climate change; universalist explanations of environmental change have unduly blamed subsistence agriculture for a range of environmental problems, such as land degradation, often without acknowledging the conservation practices of subsistence agriculturalists or recognising other dynamics ([Forsyth, 2011: 33](#)). Exploring the politics of intersecting assumptions of the causes and temporalities of climate change helps to illustrate how some approaches to environmental governance are enabled or constrained and highlights how inequalities may be reproduced in the process.

This paper has demonstrated how storytelling can be used to examine the complex intersections between different assumptions about the causality and temporality of climate change. This contributes to recent moves towards political ontology that open up space to consider the multiplicity of assumptions people may hold about the nature of reality, as well as the politics around foregrounding certain assumptions over others. Opening up pathways for alternative ways of being in and knowing the world to be acknowledged has the potential to recognise Indigenous livelihoods and resource management practices that otherwise may be marginalised within environmental policy making ([Jackson and Palmer, 2015: 134](#)). Interventions like REDD+ often impose assumptions about the environment, society and development, but stories can be used to rethink such assumptions (see also [Hau'ofa, 1994](#)). In the context of environmental change and governance, it is becoming increasingly important to understand the complexity and contextuality of intersecting assumptions of reality ([Grossberg and Behrenshausen, 2016: 1026](#)). Challenging the ways we see and frame problems like climate change allows us to consider what other assumptions and solutions might be possible. Such analysis opens up space for alternative approaches to addressing climate change grounded in and foregrounding different ways of being and knowing in the world.

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References

- Amos, Goodwill Tony, 2013. *The Forestry Sector in Papua New Guinea: MultiPurpose National Forest Inventory and Drivers of Deforestation and Forest Degradation. The National REDD+ Awareness Raising Workshop*. PNGFA, Grand Papua Hotel, Port Moresby.
- Anand, Nikhil, 2017. *Hydraulic City: Water and Infrastructure of Citizenship in Mumbai*. Duke University Press, Durham.
- Anere, D.L., 1991. *Reverend Lusa Anere: His Complete Teachings and Principles 2*.

- Australian Bureau of Meteorology and CSIRO, 2014. Climate variability, extremes and change in the Western Tropical Pacific: new science and updated country reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report. Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne.
- Babon, Andrea, Gowae, Gae, 2013. The Context of REDD+ in Papua New Guinea: Drivers Agents and Institutions. CIFOR, Bogor, Indonesia.
- Babon, Andrea, McIntyre, Daniel, Gowae, Gae Y., Gallemore, Caleb, Carmenta, Rachel, Di Gregorio, Monica, Brockhaus, Maria, 2014. Advocacy coalitions, REDD+, and forest governance in Papua New Guinea: how likely is transformational change? *Ecol. Soc.* 19 (3), 16.
- Berling, Trine Villumsen, 2011. Science and securitization: objectivation, the authority of the speaker and mobilization of scientific facts. *Security Dial.* 42 (4–5), 385–397.
- Blaser, Mario, 2009. Political Ontology. *Cult. Stud.* 23 (5/6), 873–896.
- Blaser, Mario, 2010. *Storytelling Globalization from the Chaco and Beyond*. Duke University Press, London.
- Blaser, Mario, 2013. Ontological conflicts and the stories of peoples in spite of Europe: toward a conversation on political ontology. *Curr. Anthropol.* 54 (5), 547–568.
- Brosius, J. Peter, 1999. Analyses and interventions anthropological engagements with environmentalism. *Curr. Anthropol.* 40 (3), 277–309.
- Crate A., S., 2011. Climate and culture: anthropology in the era of contemporary climate change. *Ann. Rev. Anthropol.* 40, 175–194.
- Cruikshank, Julie, 2012. Are glaciers 'good to think with'? Recognising indigenous environmental knowledge. *Anthropol. Forum* 22 (3), 239–250.
- Dalsgaard, Steffen, 2013. The time of the state and the temporality of the *Gavman* in Manus Province Papua. *Social Anal.* 57 (1), 34–49.
- Dalsgaard, Steffen, 2016. Carbon valuation: alternatives, alternations and lateral measures? *Valuat. Stud.* 4 (1), 67–91.
- Demian, Melissa, 2003. Disputing damage versus disputing ownership in Suau. In: Kalinoe, L., Leach, J. (Eds.), *Rationales of Ownership: Transcations and Claims to Ownership in Contemporary Papua New Guinea*. Sean Kingston Publishing, Oxon.
- Demian, Melissa, 2004. Seeing, knowing, owning: property claims as revelatory acts. In: Hirsch, E., Strathern, M. (Eds.), *Transcations and Creations: Property Debates and the Stimulus of Melanesia*. Berghahn Books, New York and Oxford.
- Demian, Melissa, 2006. Reflecting on Loss in Papua New Guinea. *Ethnos: J. Anthropol.* 71 (4), 507–532.
- Demian, Melissa, 2013. When we were in darkness: the hazards of knowing history on the Suau Coast. In: Bolton, L., Thomas, N., Bonshok, E., Adams, J., Burt, B. (Eds.), *Melanesia: Art and Encounter*. British Museum Press, London.
- Descola, Philippe, 2013. *Beyond Nature and Culture*. University of Chicago Press, Chicago.
- Dickson-Waiko, Anne, 2001. Women, individual human rights, community rights: tensions within the Papua New Guinea State. In: Grimshaw, P., Holmes, K., Lake, M. (Eds.), *Women's Rights and Human Rights: International Historical Perspectives*. Palgrave, London and New York.
- Dressler, Wolfram, McDermott, Melanie, Smith, Will, Pulhin, Juan, 2012. REDD policy impacts on indigenous property rights regimes on Palawan Island, the Philippines. *Hum. Ecol.* 40 (5), 679–691.
- Dwyer, Peter D., Minnegal, Monica, 2007. Social change and agency among Kubo of Papua New Guinea. *J. R. Anthropol. Inst.* 13, 545–562.
- Eilenberg, Michael, 2015. Shades of green and REDD: local and global contestations over the value of forest versus plantation development on the Indonesian forest frontier. *Asia Pac. Viewpoint* 56 (1), 48–61.
- Ernst, Thomas M., 1999. Land, stories and resources: discourse and entification in Onabasulu Modernity. *Am. Anthropol.* 101 (1), 88–97.
- Fabian, Johannes, 2014. *Time and the Other: How Anthropology Makes Its Object*. Columbia University Press, New York.
- Filer, Colin, 2015. How April Salumei became the REDD queen. In: Bell, J.A., West, P., Filer, C. (Eds.), *Tropical Forests of Oceania: Anthropological Perspectives*. ANU Press, Canberra.
- Facility, Forest Carbon Partnership, 2013. *Papua New Guinea Readiness Preparation Proposal (R-PP)*. UN-REDD, FCPE.
- Forsyth, Tim, 2011. Politicizing environmental explanations: what can political ecology learn from sociology and philosophy of science? In: Goldman, M.J., Nadasdy, P., Turner, M.D. (Eds.), *Knowing Nature: Conversations at the Intersection of Political Ecology and Science Studies*. University of Chicago Press, Chicago.
- Fujisaki, Taiji, Hyakumura, Kimihiko, Scheyvens, Henry, Cadman, Tim, 2016. Does REDD+ ensure sectoral coordination and Stakeholder participation? A comparative analysis of REDD+ national governance structures in countries of Asia-Pacific region. *Forests* 7 (195), 1–17.
- Gell, A., 1992. *The Anthropology of Time: Cultural Constructions of Temporal Maps and Images*. Berg Publishers, Oxford.
- Goldman, Mara J., Nadasdy, Paul, Turner, Matthew D. (Eds.), 2011. *Knowing Nature: Conversations at the Intersection of Political Ecology and Science Studies*. University of Chicago Press, Chicago.
- Government of Papua New Guinea, 2017. *Papua New Guinea National REDD+ Strategy for the Period of 2017–2027*. GoPNG, Port Moresby.
- Grossberg, Lawrence, Behrenshausen, Bryan G., 2016. Cultural studies and Deleuze-Guattari, Part 2: From affect to conjunctures. *Cult. Stud.* 30 (6), 1001–1028.
- Grossu, G., Attorre, F., Mollicone, D., Dargusch, P., Guillet, A., Marchetti, M., 2014. Implementing REDD+ in Papua New Guinea: can biodiversity indicators be effectively integrated in PNG's National Forest Inventory? *Plant Biosyst.* 148 (3), 519–528.
- Hastrup, Kirsten, 2016. Climate knowledge: assemblage, anticipation, action. In: Crate, S. A., Nuttall, M. (Eds.), *Anthropology and Climate Change: From Actions to Transformations*. Routledge, New York.
- Hau'ofa, Epeli, 1994. Our sea of islands. *Contemp. Pac.* 6 (1), 148–161.
- Holbraad, Martin, Pedersen, Morten Axel, 2017. *The Ontological Turn: An Anthropological Exposition*. Cambridge University Press, Cambridge.
- Ingold, Tim, 1993. The temporality of the landscape. *World Archaeol.* 25 (2), 152–174.
- Jacka, Jerry K., 2015. Alchemy in the rain forest: politics, ecology, and resilience in a New Guinea Mining Area. In: Escobar, A., Rocheleau, D. (Eds.), *New Ecologies for the Twenty-First Century*. Duke University Press, Durham.
- Jacka, Jerry K., 2016. Correlating local knowledge with climatic data: Porgeran experiences of climate change in Papua New Guinea. In: Crate, S.A., Nuttall, M. (Eds.), *Anthropology and Climate Change: From Actions to Transformations*. Routledge, New York.
- Jackson, Sue, Palmer, Lisa, 2015. Reconceptualizing ecosystem services: possibilities for cultivating and valuing the ethics and practices of care. *Prog. Hum. Geogr.* 39 (2), 122–145.
- Jetnil-Kijner, K., 2014. **United Nations Climate Summit Opening Ceremony – A poem to my Daughter** (cited 24 October 2018). Available from <https://jkijner.wordpress.com/2014/09/24/united-nations-climate-summit-opening-ceremony-my-poem-to-my-daughter/>.
- Kohn, Eduardo, 2015. Anthropology of ontologies. *Ann. Rev. Anthropol.* 44, 311–327.
- Krøijer, Stine, 2015. Figurations of the future: on the form and temporality of protests among left radical activists in Europe. In: Meinert, L., Kapferer, B. (Eds.), *In the Event: Toward and Anthropology of Generic Moments*. Berghahn Books.
- Li, Tania Murray, 2007. Practices of assemblage and community forest management. *Econ. Soc.* 36 (2), 263–293.
- Lipset, David, 2011. The tides: masculinity and climate change in coastal Papua New Guinea. *J. R. Anthropol. Inst.* 17, 20–43.
- Lipset, David, 2013. The new state of nature: rising sea-levels, climate justice, and community-based adaptation in Papua New Guinea (2003–2011). *Conserv. Soc.* 11 (2), 144–157.
- Milne, Sarah, Adams, Bill, 2012. Market masquerades: uncovering the politics of community-level payments for environmental services in Cambodia. *Dev. Change* 43 (1), 133–158.
- Minnegal, Monica, 2009. The time is right: waiting, reciprocity and sociality. In: Hage, G. (Ed.), *Waiting*. Melbourne University Press, Melbourne.
- Minnegal, Monica, Dwyer, Peter D., 1999. Rereading relationships: changing constructions of identity among Kubo of Papua New Guinea. *Ethnology* 38 (1), 59–80.
- Minnegal, Monica, Dwyer, Peter D., 2017. *Navigating the Future: An Ethnography of Change in Papua New Guinea*. ANU Press, Acton.
- Munn, Nancy D., 1992. The cultural anthropology of time: a critical essay. *Annu. Rev. Anthropol.* 21, 93–123.
- Nadasdy, Paul, 2005. Transcending the debate over the ecologically Noble Indian: indigenous peoples and environmentalism. *Ethnohistory* 52 (2), 291–331.
- Nathan, Iben, Pasgaard, Maya, 2017. Is REDD+ effective, efficient, and equitable? Learning from a REDD+ project in Northern Cambodia. *Geoforum* 83, 26–38.
- National Planning Committee, 2010. *Papua New Guinea Vision 2050*. National Strategic Plan Taskforce, Port Moresby.
- Nyambura, R., 2016. **The Racist Colonial Roots of Western Forest Conservation: A Look into a REDD Project in Kenya** (cited 26 October 2018). Available from <https://wrm.org.uk/articles-from-the-wrm-bulletin/section1/the-racist-colonial-roots-of-western-forest-conservation-a-look-into-a-redd-project-in-kenya/>.
- Pasgaard, Maya, 2015. Lost in translation? How project actors shape REDD+ policy and outcomes in Cambodia. *Asia Pac. Viewpoint* 56 (1), 111–127.
- Pokana, Joe, 2013. An overview of Papua New Guinea's readiness efforts towards the mitigating of its greenhouse gases. The 22nd Asia-Pacific Seminar on Climate Change. OECD, Sofitel Plaza, Hanoi, Vietnam.
- Rakova, U., 2012. **Sisters on the Planet – Ursula (Carteret Islands)** (cited 29 October 2018). Available from <https://www.youtube.com/watch?v=FzhN0kXcGz8>.
- Salazar, Juan Francisco, 2018. Ice cores as temporal probes. *J. Contemp. Archaeol.* 5 (1), 35–46.
- Sanders, Anna J.P., da Silva, Hakon, Hyldmo, Rut Dini, Prasti, H., Ford, Rebecca M., Larson, Anna M., Keenan, Rodney J., 2017. Guinea pig or pioneer: translating global environmental objectives through to local actions in Central Kalimantan, Indonesia's REDD+ pilot province. *Global Environ. Change* 42, 68–81.
- Simpson, Leanne Betasamosake, 2013. *Islands of Decolonial Love: Stories and Songs*. ARP Books, Winnipeg.
- Simonetti, Cristián, Ingold, Tim, 2018. Ice and concrete: solid fluids of environmental change. *J. Contemp. Archaeol.* 5 (1), 21–33.
- Smith, Will, 2018. Weather from incest: the politics of indigenous climate change knowledge on Palawan Island, the Philippines. *Austr. J. Anthropol.* 29, 265–281.
- SPC/GIZ, 2013. *REDD Feasibility Study for Central Suau, Milne Bay, Papua New Guinea*. SPC/GIZ, Suva, Fiji.
- SPC/GIZ, 2014. *Analysis of Historical Deforestation, Degradation and Land Use in Central Suau/Papua New Guinea*. SPC/GIZ, Suva, Fiji.
- SPC/GIZ, 2015. *Proposed Benefit Sharing System for REDD+ Pilot Project in Central Suau/Papua New Guinea*. SPC/GIZ Regional Project, Suva, Fiji.
- Stella, Regis Tove, 2007. *Imagining the Other: The Representation of the Papua New Guinea Subject*. University of Hawai'i Press, Honolulu.
- Tsing, Anna Lowenhaupt, 1993. *In the Realm of the Diamond Queen: Marginality in an Out-of-the-Way Place*. Princeton University Press, Princeton.
- Tsing, Anna Lowenhaupt, 2005. *Friction: An Ethnography of Global Connection*. Princeton University Press, Princeton.
- van Helden, Flip, 1998. *Between Cash and Conviction: The Social Context of the Bismarck-Ramu Integrated Conservation and Development Project*. The National Research Institute, Boroko.

- Vigh, Henrik Erdman, Sausdal, David Brehm, 2014. From essence back to existence: anthropology beyond the ontological turn. *Anthropol. Theory* 14 (1), 49–73.
- Watts, Vanessa, 2013. Indigenous place-thought & agency amongst humans and non-humans (First Woman and Sky Woman go on a European world tour!). *Decoloniz.: Indigen. Educ. Soc.* 2 (1), 20–34.
- Wickman, Thomas, 2018. Narrating indigenous histories of climate change in the Americas and Pacific. In: White, S., Pfister, C., Mauelshagen, F. (Eds.), *The Palgrave Handbook of Climate History*. Palgrave Macmillan, London.
- Winduo, Steven (Ed.), 2009. *Reframing Indigenous Knowledge: Cultural Knowledge and Practices in Papua New Guinea*. Melanesian and Pacific Studies, University of Papua New Guinea, Port Moresby.