
**The Spirits of Conservation: Ecology,
Christianity, and Resource Management in
Highlands Papua New Guinea**

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Abstract

In environmental circles there are two long-running debates about (1) whether indigenous peoples are truly conservationists, and (2) whether Christianity is inherently inimical to conservation. In this article, I bring these two debates into dialogue by exploring the changes in resource management practices of an indigenous group in highlands Papua New Guinea, many of whom have recently converted to Christianity. In Porgera, spirits are critical for maintaining and regulating ecological affairs, so it could be assumed that Christianity would erode whatever conservationist principles are extant in traditional religious belief. This is not the case, however. Traditional, conservation-like practices were dependent upon particular spirits, resources, and ecological zones. Christianity has engaged with these spirits, resources, and zones in complex ways. I argue that we need more nuanced understandings of how the global spread of world religions are integrating with traditional resource management practices to promote sustainability more effectively.

The Spirits of Conservation

In 1972, at the height of a severe El Niño-caused drought, sweet potato vines in the Porgera valley lay desiccated and withering, presaging a potential famine. Sweet potato, the staple crop across much of the Papua New Guinea highlands, is extremely susceptible to the climatic anomalies—the droughts, the cold, clear nights that bring crop-destroying frosts, and even deluges of rain—that accompany El Niños. In several communities in the eastern part of the Porgera valley, people were debating about whether or not to conduct a sacrificial ritual to an ancestral

spirit, named Lemeane, believed to be responsible for regulating the rainfall and increasing the fertility of the crops. Leo Itai, who had recently converted to Catholicism, urged everyone to forget about the old religion and have faith that the new, Christian God would end the drought. When it seemed almost certain to Leo that his plea was not being heard by his kinspeople, he stealthily slipped off to the ritual shrine hidden in the dense, high-altitude rain forest. With the butt of his axe, he attacked the massive stone shrine where countless numbers of pigs had been slaughtered and offered to the guardian spirit of the shrine. With a huge chunk of stone in his hand from the 'bones' of the ancestral spirit, Leo returned to the hamlet and told everyone of how he had desecrated the shrine, with no ill effects, proving that the old religion had lost its power. A few months later, Leo and some other converts invited the expatriate Catholic priest in the area to come and pour holy water on the site to ensure the ascendancy of the new religion. Two years later, when Leo's eldest son was born with two thumbs on each hand, people were less certain that the power of the ancestral spirit had been fully eradicated by Christian ritual.

The themes that this brief vignette touch upon—the power of modernization and Christianity to erode the belief systems of indigenous peoples—are almost so taken for granted that they hardly merit discussion in most circles. However, it is my goal in this article to examine more critically this assumption by exploring the relationships among changing environmental values and practices and conversion to Christianity in Porgera. These topics also allow me to engage with a number of contemporary debates regarding (1) conservation and indigenous communities, (2) Christianity and environmental ethics, and (3) the impacts of globalization on traditional environmental knowledge and natural resource management practices. My concern in this article is that the scant literature that exists on the impact of Christianity on traditional environmental knowledge and natural resource management indicates that Christianity erodes sustainable environmental practices (see Berkes 2008). I argue, however, that this is a more complex issue and we need to be attendant to the manifold ways that Christianity articulates with local environmental practices and ideas resulting in hybridized forms of traditional environmental knowledge and natural resource management.

My interest in these issues comes out of two development projects where I have conducted research since 1998.¹ The first of these is the

1. Ethnographic research was conducted in Porgera from December 1998 to February 2000 and in November and December 2006, for a total period of 16 months. Funding was provided by the Wenner-Gren Foundation, Oceania Development

long-term development and impact of the Porgera Gold Mine, which has been operating since 1990 and is one of the top ten gold producers in the world (Biersack 2006). The second project is a newly proposed protected area in Porgera that is being sponsored by Conservation International and the Papua New Guinea Department of Environment and Conservation (Richards 2007). Given the environmental devastation wrought by mining, it is apparent that some sort of environmental protections are needed, but it is critical to understand how notions of conservation and environmental protection are conceptualized and formulated by local communities for successful conservation to occur (see Wright 2007). At this time, the conservation project is still in the planning phase, but given the overriding interest in environmental circles on the relationships between communities and conservation, it is illustrative to look at how environmental attitudes and practices have been changing in Porgera since Christianization.

The volumes of literature that have come out of discussions concerning conservation and community indicate that conservation is a complex set of practices and discourses that operate on simultaneous levels, such as the local, regional, national, and global, and that there are no easy solutions for solving the communities and conservation crisis (Redford and Stearman 1993; Agrawal and Gibson 1999; Brosius, Tsing, and Zerner 2005; West, Igoe, and Brockington 2006). The need to understand the cultural implications for conservation has become more prominent within the international conservation community, but as Peter Brosius and Diane Russell (2003) have documented, these studies primarily are structured around rapid assessment and formalistic models that offer easy replicability from place to place. What gets left out in these kinds of studies is the fine-grained cultural analysis that is necessary for conservation agendas to be accepted by local populations. However, even in anthropological studies of conservation that do provide the sort of fine-grained analysis that is important, there is something else missing from much of this research, which falls under the rubric of what Fikret Berkes (2008) calls 'sacred ecology'. With the concept of sacred ecology, Berkes argues that in the majority of settings where anthropologists work they find that 'systems of indigenous knowledge include spiritual or religious dimensions (beliefs) that do not make sense to science or fall outside the realm of science' (2008: 11).² Berkes's goal is to unite previous research

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2. Of course, one of the key aims in environmental anthropology is to 'make sense' of these beliefs for outsiders, if not always in the terms of the people they study (e.g. Århem 1996; Descola 1996; Viveiros de Castro 1998, to name a few).

on traditional ecological knowledge with insights from Tim Ingold and Gregory Bateson. From Ingold (2000), he draws on the perspective that for animists there is life in spirits and parts of the environment 'that Western science considers inert' (Berkes 2008: 11). Life, therefore, can be 'immanent in the very process of that world's continual generation or coming-into-being' (Ingold 2000: 10). Evidence of this is seen, for example, in Julie Cruikshank's (2005) work among native peoples in the St Elias Mountains on the border of Alaska and Canada, in which Tlingit and Tagish stories about glaciers describe human actions of disrespect as the cause of glacial surges, not climatic or environmental factors. From Bateson, Berkes draws the notion of the sacred in reference to trying to address the complexity of human-environmental relations in which 'the unity of nature...might only be comprehensible through the kind of metaphors familiar from religion...an integrative dimension of experience' (Berkes 2008: 11, citing Bateson and Bateson 1987: 2). Berkes thus urges us to move beyond reductionist visions of ecology by embracing the moral perspectives and spiritual aspects often embedded in traditional ecological knowledge systems and local resource management practices (however, see Tiedje 2007 for a critical analysis of the 'sacred' in conservation).

While this is an important perspective, it also demands an understanding of how these systems and practices accommodate change. As Berkes argues, traditional ecological knowledge does not mean something traditional in the sense of it being closed to historical influences. His working definition for traditional ecological knowledge is 'a cumulative body of knowledge, practices, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment' (Berkes, Colding, and Folke 2000: 1252; see also Agrawal 1995). While this definition obviously accommodates processes of change, it still begs the question of how traditional ecological knowledge systems articulate with rapid and large-scale cultural and environmental changes, such as are occurring in the face of global processes like modernization, conversion to world religions, and so forth, and what the implications are for local livelihoods.

The remainder of the article is structured as follows: first, I discuss some of the controversies surrounding indigenous and Christian conservation ethics. Following this, I turn to my research in the Porgera valley and examine how traditional environmental knowledge was a set of practices and ideas that developed through human relations with spirits and other non-human components of the environment. After this, I look at the influence of Christianity on the sets of relations that one can

have with humans, spirits and non-human entities, and the land, and the effects of this on environmental knowledge and practices. Finally, I discuss how all of these issues are framed within larger concerns about conservation and the implications for reconciling religion with environmental issues in Porgera and elsewhere.

Conservation in Indigenous Societies

There has been a long-running debate in environmental anthropology and the conservation literature that initially asked the question: Are indigenous people conservationists? (for overviews, see Balée 1998; Sponsel 2005). Both Kent Redford (1991) and Shepard Krech (1999) claim that indigenous people have been wrongly depicted as the original ecologists. Redford argues that the contemporary notion of the relationship between indigenous people and their environments is a continuing legacy of Euroamerican thought that idealizes indigenous cultures as a foil to Western social institutions (Conklin and Graham 1995: 696).³ Whereas in the late Enlightenment Native Americans were seen as noble savages, by the late twentieth century the theme of noble savagery had been recast with an ecological emphasis in popular and academic circles (Redford 1991). Redford claims, however, that the idea of the ecologically noble savage is but a myth. According to Redford, when indigenous people acquire guns, chainsaws, and motorized transport, they destroy their environments just as readily as people in the West.

This debunking of the myth of indigenous peoples as conservationists found fertile ground among archaeologists, ethnohistorians, and human behavioral ecologists. In a 2000 *Annual Review of Anthropology* article, the human behavioral ecologists Eric Smith and Mark Wishnie (2000: 493) concluded that voluntary conservation by indigenous people is 'rare'. It is rare because conservation cannot merely involve sustainable use, it must also '(a) prevent or mitigate resource depletion, species extirpation, or habitat degradation, and (b) be designed to do so' (Smith and Wishnie 2000: 501). The problem with emphasizing that there must be a design component to conservation implies that indigenous people (1) have a philosophical tradition that sees humans as separate from the natural world, (2) utilize Western notions of cause and effect as explanatory

3. An excellent example of idealization and its opposite is illustrated in the works of Colin Turnbull (1961, 1972), who worked among the Mbuti and the Ik in central Africa. Whereas the Mbuti lived in harmony with their environment, Turnbull depicted the Ik as degenerate and living in disharmony with their natural surroundings (see Sponsel 2005).

mechanisms, and (3) categorically divide things up into 'resources' and 'species' in their linguistic and cognitive worlds (Nadasdy 2005).

Countering these claims were works that argued that the activities of indigenous people were environmentally beneficial and could perhaps be perceived as conservation (Rappaport 1984; Lansing 1991; Balée 1992; Sponsel 1992; Fairhead and Leach 1996; Dove and Kammen 1997; Deloria 2000; Harkin and Lewis 2007; Ntiama-Baidu 2008). For example, James Fairhead and Melissa Leach (1996) write that in West Africa, even with expanding human populations, there are evident increases in forested areas in several countries. Visions of rural land-use practices leading to deforestation are the result of politicians, planners, and academics 'misreading the landscape' by failing to recognize that forest islands are *not* remnants of a larger, degraded forest, but are caused by human reforestation of the savanna. In a similar vein in South America, William Balée (1992) compared species diversity in forested tracts of fallow garden sites with surrounding non-impacted forests. He found that whereas species composition is different between the two forest types, the difference in species diversity is insignificant. He writes, 'Old fallows represent the logical opposite of deforestation—they are, in other words, reforested patches of vegetation, even if the most important species are different from the aboriginal forest' (Balée 1992: 192-93; see also Balée 1998). Likewise, data on edge effects, where subsistence gardens meet forests, indicate that human activities increase biodiversity in these areas (Smith and Wishnie 2000: 499). Finally, Hunn *et al.*'s (2003) study of seagull egg harvesting by Alaskan Tlingit people implies that traditional techniques of harvesting may actually improve the breeding success rate of glaucous-winged gulls.

Janis Alcorn (1993) has countered persuasively, though, that the question should not be if indigenous peoples are conservationists, but: What kinds of conservation are various groups and individuals claiming to represent? While many conservationists would probably argue for a generally enforced preservationist approach (e.g. Robinson 1993; Oates 1999; Terborgh 1999), many cultural and environmental anthropologists often support context- and case-dependent specific management plans (e.g., Nadasdy 2003; Igoe 2004). Working from the extreme opposites that indigenous people are or are not conservationists, Les Sponsel argues, 'It is far more scholarly and scientific to consider this great diversity [of cultural engagements with the environment] through particular cases, rather than to over-generalize in either idealistic or derogatory excess' (Sponsel 2005: 1212).

Christianity and Conservation

This brings us to the question, then, of how Christian theological conceptions of the relationship between humans and non-human components of the environment articulate with the sacred ecology of indigenous peoples who have recently converted to Christianity, such as is the case at Porgera. Over the last few decades, there has been a sustained debate about whether Christianity and environmental conservation are compatible with one another (Barbour 1973; Spring and Spring 1974; Kinsley 1995: Chapters 8 and 9; Hessel and Ruether 2000; Whitney 2005; Horowitz 2008). Lynn White, Jr was one of the first people to discuss this when in 1967 he published an article in *Science* called 'The Historical Roots of our Ecologic Crisis'. In this article, White laid the blame for the (then) contemporary environmental problems facing humanity at the feet of Judeo-Christian attitudes towards nature. The premise of White's argument is, 'What people do about their ecology depends on what they think about themselves in relation to things around them. Human ecology is deeply conditioned by beliefs about our nature and destiny—that is, by religion' (1967: 1205). In the Ancient and Medieval West, when Christianity supplanted the Animistic beliefs of the common people, 'Christianity made it possible to exploit nature in a mood of indifference to the feelings of natural objects' (White 1967: 1205). Contemporary Western society, according to White, is 'post-Christian', yet nevertheless is underpinned by Christian ideals which posit human dominion over all the other species on the planet, especially as found in Gen. 1.28-29.

Nevertheless, an alternative Christian view was provided in White's article that contrasted the notion of domination to one of stewardship, such as Saint Francis of Assisi's insistence on the equality of all species and the humility of humans (see also Dubos 1974; Gottlieb 2007). Contemporary Christian ecotheologists (and even Pope John Paul II) have emphasized this message of stewardship that is also prominent in the Bible (Berry 2006; see also *The Green Bible* 2008). However, an inherent problem with the concept of stewardship for some Christians, as Clare Palmer writes, is that it sees 'God...as an absentee landlord, who has put humanity in charge of his possessions', rather than as an active force in the world (2006: 68). Palmer (2006: 70) also points out that the concept of ecological stewardship serves to remove humans from their place in the natural world in that humans are still seen as distant and having a form of control, albeit nurturing and benign, over the environment.

Both dominion and stewardship, then, pose problems for reconciling Christianity with environmentalism, and both also further a dichotomy between nature and culture that environmental social scientists are

trying to overcome. Another issue with White's thesis is that it presupposes that Animism and other indigenous beliefs would *naturally* have a conservation ethic. The real concern for both Christianity and indigenous beliefs is to understand the cultural and historical forces that shape environmental values at particular moments in time. To this end, in a follow-up to his 'Historical Roots' essay, White (1973) argued that it was not Christianity per se that was inimical to nature, but rather Latin Christianity (as opposed to Eastern Orthodox Christianity) with its valorization of technology that fostered a rampant exploitation of the natural environment.

At this juncture, I want to turn to my case study and discuss some of the ecological and social factors at work in shaping Porgeran practices and ideas about people, spirits, and the landscape.

Porgeran Eco-cosmology

The Porgera valley watershed covers about 526 sq km and ranges in elevation from 900 meters above sea level in the north to around 3900 meters in the south. Approximately 87% of the valley is covered by montane rain forest. Prior to the Porgera Gold Mine opening in 1990, nearly everyone engaged in subsistence horticulture centered around sweet potato cultivation that was supplemented by pig rearing. Hunting and gathering were important secondary economic activities providing a wide range of animal and plant resources. Today, the Porgera Mine produces on average about 900,000 ounces of gold per year. Under mining agreements reached with local landowners, 1% of all mining proceeds are paid to the landowners annually. Seven of approximately 40 clans in the valley receive these payments on a quarterly basis. This infusion of cash into a previously subsistence-based economy has resulted in thousands of outsiders flooding into the valley to participate in the share of wealth. Vast numbers of Porgerans, however, receive no mining revenue, and as they put it, 'still live like our ancestors', raising pigs and sweet potatoes.

The aboriginal inhabitants of the Porgera valley were predominantly Ipili speakers and numbered about 5000 in the 1980 census. By 1990, the population had doubled. By 2000, it had reached over 25,000. An early 2008 estimate by the mining company was that, then, 42,000 people lived in the valley. The vast majority of the newcomers are Enga and Huli speakers who live to the east and south, respectively, of the Porgera valley. Many of them have lived in Porgera for years, marrying into Ipili clans, building houses and gardens, and raising children. Porgera today, therefore, is a multilingual, multicultural enclave of groups from around

the region, especially along the road which was built to service the mine. This population influx has resulted in deforestation and overuse of resources and makes concerns about conservation critical. In fact, in 2006, for the first time ever, I saw bundles of firewood being sold along the main road, indicating a shortage of fuel wood trees locally.

Porgerans divide their mountainous landscape into three distinct environmental zones that are perceived to have their own plant and animal species, climates, appropriate activities, and spirits. The lowest zone, called *wapi*, is located from sea level to 1600 meters above sea level. Above the *wapi* is a middle zone that extends from about 1600 to 2200 meters, called *andakama*, which translates as the 'the place of houses and clearings'. Above 2200 meters is the *aiyandaka*, which translates as 'the place of beauty', in recognition that it is the zone where puberty rituals were performed until quite recently.

The *wapi*, or lower rain forest, is conceptualized as a hot, dry region even though it is covered in rain forest. It is considered to be the most biodiverse part of the environment and indeed a number of culturally and economically important species are hunted here, such as various birds of paradise, cassowary, wild pigs, and marsupials, which supply meat for consumption as well as feathers and skins for adornment. A key resource that is sought after in the *wapi* is megapode eggs. Mounded nests of these birds can contain dozens of large eggs and taboo markers are placed on the nests to signify to others that someone has already claimed the eggs. Nuts and mushrooms are also gathered from the *wapi*. The key species that defines the *wapi* from the *andakama* is fruit pandanus trees (*Pandanus conoideus*) which do not grow in the middle zone of houses and clearings. Porgerans do not live or garden in the *wapi* as it is an area associated with malaria, sorcery, and deadly forest spirits, which I discuss in more detail later.

Traditionally, the *andakama*, between 1600 and 2200 meters, was where houses and gardens were located. Settlement below 1600 meters is constrained by threats of disease and death, while settlement above 2200 meters is constrained ecologically as it is near the altitudinal limits at which taro and sweet potato can grow. When the road that services the mine was built into Porgera, however, it was not built in the *andakama*, but instead was located in the highest zone, the *aiyandaka*. As a consequence the bulk of the population is now found along the highway living between 2000 and 2400 meters. Many households still have their gardens in the *andakama*, although the daily trek from house to garden and back again is a source of complaint for many due to the steep climb.

The *aiyandaka*, or upper rain forest, is conceptualized as a cold, wet region, which indeed it is. The lowest portions of the *aiyandaka* in

Porgera about massive limestone mountains that tower over 1000 meters above the surrounding valley. In the late afternoons, clouds pile up against the base of these mountains resulting in cold, drenching rains throughout the upper rain forest. Traditionally, the aiyandaka was where puberty rituals were held that aided young people in preparation for marriage. Spells were learned that allowed both men and women to protect their bodies from the rigor of sexual intercourse, pregnancy, and child rearing (Biersack 1998b). The work of reproduction is said to deplete the body of *ipane*, or grease. The loss of grease from raising children can be seen in people becoming wrinkled, their hair turning gray, and so forth, and spells learned in puberty were said to be efficacious in slowing the aging process.

Similar to human bodies, the land itself was believed to portray signs of its ecological decline; and like human bodies, rituals for the land ensured that *yu ipane*, or 'land grease', could be put back into the ground so that domesticated and wild tree and plant species grew well. These rituals involved a variety of ancestral and forest spirits and it is this human-spirit-land nexus that is central to conservation practices and beliefs in Porgera. Most of the ethnographic examples we have at hand articulate the relationships that people have with actual resources, whether these relationships are between Athapaskan hunters and caribou, Amazonian Indians and tapirs, or Icelandic fisherman and cod. In Porgera, the important distinction is that it is the relationships between people and spirits that are central to understanding ecological principles. The animals they hunt are almost of secondary consideration. Thus when Porgerans build traps to catch cassowaries, the spells they use on their traps are geared more toward the spirits that control cassowaries than the cassowaries themselves. This is also why I am concerned with the impact of Christianity on spirit beliefs in that the relationships that occur between humans and spirits are of greater importance for Porgerans than those that occur between humans and animals (see Wright 2009 for an analogous argument regarding humans, spirits, and material excesses among the Baniwa of the northwestern Amazon). Similarly, Roy Rappaport, a founding figure in environmental anthropology, who conducted research among the Tsembaga Maring of the Papua New Guinea highlands in the 1960s and examined ritual regulations on ecological systems, wrote, 'Although this study has been primarily concerned with the role ritual plays in the material relations of the Tsembaga, it is nevertheless the case that the Tsembaga say that they perform their rituals to rearrange their relations with spirits' (1984: 237; cf. Robbins 2006 for a different human-spirit-land nexus among the Urupmin of Papua New Guinea). This statement illustrates the need to

understand the spiritual ecology of a culture, and not just material practices.

While there are a vast number of spirits that Porgerans recognize in their environment, only a handful have any important role in regulating ecological processes and punishing people who wantonly overharvest resources. The first set of spirits focused on here is the ecological regulators, and secondly, those that regulate human activities toward the environment.

Ipane, or grease, is an important component in understanding Porgeran conceptions of human and ecological well-being. The word ipane can be parsed into the words *ipa*, or water, and the nominal suffix *-ne*, which means 'the thing that is like X', with X being the noun modified by the suffix. Ipane literally means grease, the thing that is like water. Controlling the flow of ipane through the Porgeran universe is therefore an exercise in controlling the flow of water. In terms of bodily practices, men and women replenish grease in their bodies by drinking large bamboo tubes of bespelled water (Jacka 2007).⁴ In terms of ecological processes, humans control the flow of grease through the land by appealing to spirits that regulate the flow of water.

Each ecological zone had spirits that did this. In the upper rain forest, a ritual called *auwalo anda* was performed to an autochthonous spirit named Lemeane (described in the first paragraph of this article). Appeals were made to Lemeane whenever there was a major drought, such as those linked with strong El Niño events, which in this area of the world would have required a ritual about once a decade. The last such ritual occurred in the 1960s (Gibbs 1975). Participants at this event described it as being a collective event involving dozens of clans in the valley. Elders would send word that the *auwalo anda* would be held and each clan had a designated product of the forest or garden that they were to contribute to the ritual. Everyone was required to bring pigs to sacrifice to Lemeane and at the end of a successful ritual when pigs and produce were offered to Lemeane and consumed by the participants, the rains would start to fall, the streams would fill, and the ipane would flow through the land again (see also Biersack 1998a).

In the *andakama*, the middle zone of houses and gardens, the clan's ancestors who lived in a pool in the forest were believed to be responsible for ensuring the flow of grease in gardens and in their descendants'

4. Through daily activities, such as agricultural work, sexual intercourse, child rearing, and so forth, Porgeran bodies become 'dry' (*kapu*). In many rituals, spells are spoken over bamboo tubes of water that diminish this state of dryness and restore suppleness and freshness to a person's skin.

bodies, thus keeping them healthy. The ancestors lived in a pool called *ipa ne*, the 'ne' in this sense being the continuative aspect of the verb *na*, 'to eat'. *Ipa ne*, therefore, can be translated as 'the water that (must) regularly eat'. Whenever gardens were failing and people were getting sick, the clan leaders would kill one or two pigs and make a bundle of meat and fat that they would carry up to the clan pool. They would call the names of deceased lineage heads and then hold the bundle of pig meat and fat above the pool with a long stick. The water would rise up and grab the pork offering and the participants would, as one man put it, 'run like hell back to the hamlets', as people generally try to limit their interactions with spirits.

In the lower rain forest, far beyond the boundaries of the Porgera watershed, two spirits named Elape and Kelape live near a giant sink-hole down which all of the waters in the world flow. Porgerans discuss these two, saying that they have very long arms and pluck debris out of the water to keep the waters in the world from backing up and flooding Porgera. No rituals were done for Elape and Kelape, but Porgerans assume that the people on whose lands the spirits live must have rituals for them (see Stewart and Strathern 2002 for the downriver Duna rituals).

Just as each of the environmental zones in Porgera has spirits that regulate ecological processes, each zone also has spirits that regulate human interactions with the environment. In the upper rain forest, spirits called *tawe wandakali*, or sky people, are considered to be the caretakers of animals and plants in this zone. Marsupials of the upper rain forest are called the 'pigs' of the sky women, and wild pandanus trees which bear large pandanus nut (*Pandanus brosimus*) pods are called the 'sweet potato' of the sky women. Sky men are responsible for lightning, and sky women cause drenching rains. There are no rituals conducted to sky people, but Porgerans state that human actions in the upper rain forest are under the constant watch of sky women. In 2006, while doing forest vegetation surveys, Wanpis Kaipas, one of my research assistants, chopped down a giant taro plant (*Alocasia macrorrhiza*) while we were in the upper rain forest. While Porgerans do not consume these, they refer to them as the 'taro' of the sky women. Wanpis's brother, Solomon, scolded him for wantonly hacking up the plant noting that his actions would anger a sky woman and make it rain on us later—which it invariably did. Other men told me that occasionally one must cut down a pandanus tree to get at the nut pod due to the mossy, wet trunk making it impossible to climb. After cutting the tree, if one fails to mourn the tree just like one would mourn a dead relative then sky women take offense. Other actions that upset sky women are wantonly chopping trees and plants, overhunting marsupials, and defecating on or near a trail. To

punish transgressors, sky women send heavy rains and mists that can confuse a person and cause them to get lost, injured, or even fall to their deaths off of a cliff. The main way that sky women regulate human actions toward the environment is by 'hiding' resources from people who fail to show the proper respect while in the upper rain forest.

In the *andakama*, the middle zone, there are no spirits that regulate human interactions with the environment. This is primarily because the *andakama*, the zone of houses and gardens, is first and foremost a place where cultivation is supposed to occur and, hence, conservation in its preservationist sense is contrary to productive activities. Due to environmental conditions, forest regrowth in Porgera is very rapid and people's biggest fear is that the forest will erase the years of productive labor that they have put into the land (cf. Haenn 1999 for Mexico). In 1999, when the uncle of my research assistant, Peter Muyu, died, Peter cried and sang a mourning song about how the forest was going to come to cover up his uncle's gardens. I later asked him about it and he said it is through people's gardens that their descendants remember them because to work in the forest clearings brings memories of one's ancestor's hard work. His uncle's sons had all left to go work at the gold mine and now there would be no one to keep the gardens cleared and in essence the memory of his uncle's productive time on the landscape would be erased.

In the lower rain forest (*wapi*), the most important spirits in terms of conservation are called *yu angini wanda*, or 'earth mother women'. Despite this rather benevolent-sounding name from a Western environmentalist perspective, to Porgerans these spirits are the most feared among the pantheon that inhabit their world. Earth mother women can, and occasionally do, kill anyone they come into contact with in the lower rain forest. Cassowaries and marsupials are the 'pigs' of the earth mother women, while fruit pandanus are called their 'sweet potatoes'. As the most biodiverse and environmentally rich ecological zone, hunting and gathering trips into the lower rain forest can result in spectacular foraging success. However, hunters who are too successful risk allusions by others that they have entered into sexual and marital relations with earth mother women, who as caretakers of the game, ensure that their hunter/lovers never fail to find game. After a man has taken an earth mother woman as his wife, he becomes a renowned hunter. But at some point in the relationship, the earth mother woman appears in a dream and asks the hunter for the life of a kinsperson in reciprocity for the game she has sent him. If the hunter refuses to sacrifice a kinsperson, then the spirit woman will kill her lover (cf. Sillitoe 1996: 201-17).

Clans in Porgera control blocs of land in each of the three ecological zones. In the lower rain forest, people say that earth mother women

know the owners associated with the areas of land where they live. To make occasional trips to the lower rain forest on one's own land for resources is okay. If one starts taking too many resources or if one is gathering resources on another clan's land, then the earth mother women will attack the transgressor. Earth mother women are extremely unpredictable, though, and many people mentioned that even if on one's own land, one just cannot be sure if they will attack or not. This fear works as an obvious constraint on overharvesting, especially in this zone.

What intrigues me about Porgeran conceptions of their environment is that a notion like conserving the 'environment' at large is meaningless. Ethics of conservation depend upon specific activities of resource procurement in particular ecological zones. Human-spirit relations are a fundamental component that structure human interactions with natural resources. What, then, does recent conversion to Christianity in Porgera foretell for the spirits of conservation and human interactions with them?

Christianity and the Spirits of Conservation

Porgerans first started converting to Christianity in the 1960s. While a handful of gold prospectors and Australian colonial officials had visited Porgera prior to that era, the Porgera valley remained 'restricted' in official colonial policy until 1961—meaning that Porgerans had not been pacified and brought under administrative control. Missionization by expatriates was done covertly during the late 1950s, however. Seventh Day Adventists and Lutherans set up mission stations to the east of the Porgera valley in unrestricted areas and sent in Enga catechists to preach and educate Porgerans about Christianity. After opening the valley in 1961 to outsiders, Catholic, Lutheran, Apostolic, and Seventh Day Adventists missions were established in several locales throughout the valley. Following Independence in 1975, most of the mission work was localized and expatriate missionaries only rarely visited the region. Today, Porgeran pastors are trained by Enga church leaders in the more populous areas of Enga Province to the east of Porgera. Thus, generally, Porgeran Christian theological doctrine is interpreted and explained by men and women with very little formal education who often link theological stories back to ancestral myths and stories common in Porgeran culture.

In areas where I have done censuses, about 65% of the people claim to be Christians. About half of this number are Seventh Day Adventists, or SDAs, while the rest are equally comprised of Apostolics and Lutherans.⁵

5. While there are Catholics in Porgera today, there are none in the areas where I work.

Despite four decades of Christian conversion, Porgeran belief in earth mother women and sky women has only been intensified. Part of this has come about by associating these spirits with demons and angels, respectively. Early missionaries supported this by calling angels *tawe wandakali*, 'sky people', and referring to heaven as *tawe toko*, the land where the sky women and men live. In public settings, Christian Porgerans make a distinct point of negating their belief in various spirits, or at least the ability of these spirits to have any activity in their lives. Individually, though, people still act in ways that illustrate the power of spirits to influence them. For example, I bought a fruit pandanus at a market in a neighboring valley for a Porgeran friend who was an elder in the Seventh Day Adventist church. I arrived in the evening and gave him the pandanus. As the sun went down, he took the pandanus, wrapped it in banana leaves, and then hid it about 40 meters from his house at the base of a tree. Refusing at first to answer my question of why he did not just leave the pandanus in his house, he ultimately admitted that as earth mother women are the 'owners' and planters of fruit pandanus, he feared that having the fruit in his house might cause an earth mother woman to attack someone in his family during the night. Merely indicating his fear of the earth mother woman in front of other church members would have resulted in his censure and loss of his prestigious elder status.

One means that Christian Porgerans have to talk about traditional spirits is by linking them to Satan. Epe Des, an SDA pastor in Porgera, explained to me,

Before we thought that there were all kinds of spirits but that was before we knew about Christianity. Now we know that these spirits aren't really spirits, they're just Satan is all. When we would make offerings of pork to the ipa ne or to the auwalo anda, Satan was tricking us and stealing our pigs from us. The earth mother women that people see down in the lower rain forest, this is just Satan, trying to turn our thoughts away from God.

What I find interesting about Epe's statement is that he does not deny the reality of the spirits; rather, it is that their basic nature has been misinterpreted by Porgerans who were not aware of Christianity.

One area in which Christianity has fundamentally altered Porgeran ideas about the landscape, however, is in terms of the demonization of the land. Porgerans state that when Jesus died, every place in the world was cleansed of sin and demons by his blood, with the exception of Papua New Guinea (cf. Kulick 1992). Denominational differences dictate what needs to be done to rectify this situation. Lutherans by and large just see it as a problem to be lived with. Among SDAs and Apostolics, however, there is an urgent concern to hasten the coming of the

apocalypse. Discussions with members of these two denominations indicate a great excitement with the destruction of the current world, which is full of sin and the spirits of Satan, and the ascension to a new land in heaven that is God's promise to the faithful (see also Robbins 2004; more generally Cannell 2006).

The implications for conservation that come out of Christianization are, therefore, paradoxical. A primary assumption is that the transformation of beliefs about spirits could lead to the loss of their role in regulating human use of resources among Christians. The corollary assumption is that non-Christians would continue to believe in spirits and consequently continue to limit their use of resources. The opposite appears to be true, though. When non-Christians saw Christians challenging traditional spirit beliefs, it was the non-Christians who started taking game in increasing numbers. For instance, I was once talking about hunting in the upper rain forest with a group of men when one of them bragged about how he had killed over 60 tree kangaroos within the last year. I asked if he was not worried about the sky women becoming angry, and he replied that there were no sky people spirits, that was just something the Christians believed in.

Another assumption might be that with SDA and Apostolic focus on the return of Jesus and impending apocalypse, there might be less concern about caring for the environment given its soon-to-occur destruction. In fact, in another region of Papua New Guinea, villagers affiliated with the Assemblies of God church were planning on selling their land rights to logging companies in the mid-1990s in order to spend a few good years living off the proceeds before Jesus returned in the year 2000 (Stritecky 1999). While some SDAs mentioned these kinds of plans to me regarding mining rights prior to the year 2000, given that the timing of the apocalypse is much less certain today, Porgera Christians remain pragmatic and recognize the importance of their land for gardening and local resource extraction and are thus unwilling to sell off or wantonly destroy their environment.

When I discussed hunting with Christians, many of them, especially the SDAs and Apostolics, said that they were worried about the implications of eating cassowaries, marsupials, and pythons—traditionally the three most important game resources. As Pastor Epe decried, 'There are no cassowaries in the Bible. If God would have wanted us to eat cassowaries it would be in the Bible. And the Bible also says not to eat animals that walk about in the night, nor animals that crawl on their bellies'. As the former group includes most of the marsupial species around Porgera, which are nocturnal, Christians avoid eating these mammals, and also refuse to eat pythons which comprise the latter

group. Another component of Christianity that paradoxically lends itself to conservation in the upper and lower rain forests is the idea that most traditional lifestyle practices are not part of what constitutes a modern, Christian worshiper. Christians are expected to be in the house, the church, or the garden, not foraging for resources in the rain forest. My insistence on studying foraging practices in the forest finally met with the exasperation of my Christian research assistant Peter, when he exclaimed that our research activities were making people talk about him—they were accusing him of being a *kanaka*, a derogatory pidgin term that refers to an unsophisticated, rural Papua New Guinean.

Fundamental denominational differences regarding the environment are split between Apostolics and SDAs, on the one hand, and Lutherans on the other. Working in gardens with SDAs and Apostolics, I have always noticed that members of these denominations pray after planting crops. Gardening with a Lutheran pastor, Kaipas Wangi, in November 2006, I was struck that after working in the garden, rather than stopping to pray, we just walked back down the hill to his house. Once inside, I asked why SDAs and Apostolics pray after planting gardens and Lutherans do not. Kaipas noted:

Part of the reason the Lutherans are different from Apostolics and SDAs has to do with how we think people will go to heaven. The SDAs and Apostolics think that the decision to go to heaven or hell is inside them, based on their actions here on this ground. If they live good lives they believe they'll go to heaven. If they live in sin, they'll go to hell. The Lutherans and the Catholics, however, think that the decision to go to heaven or hell is with God... Because of that, there is no reason to pray to God in our gardens as He sends equal amounts of rain and sun to the land. It is crazy to think that He would take the time to single out a particular patch of land to make the crops grow better there. God takes care of all the land and makes sure that everything grows.

This split between Lutheran predestination and the personal salvation that SDAs and Apostolics believe in also explains attitudes about eating certain game animals and being in the forest seeking resources. Lutherans do not have concerns about hunting and eating marsupials being seen as sinful since ultimately their salvation lies in God's hands, not through their own actions.

The introduction of Christianity, therefore, has not resulted in the demise of beliefs in spirits, in general, although it has altered the beliefs in certain kinds of spirits and their powers. Among the non-Christians, while their fear of the power of spirits that regulate human use of resources has declined, they still believe strongly in spirits that regulate social and ecological matters, such as Lemeane and the spirits of the clan

pool. In contrast, Christians believe less in these latter spirits, but still strongly believe in sky people and earth mother women due to their being linked with angels and demons, respectively.

Conservation and Institutional Absence

The tropical rain forests of Papua New Guinea comprise approximately half of the third largest extant area of rain forests in the world (Shearman *et al.* 2009), with some of the richest flora in Southeast Asia found on the island of New Guinea⁶ (Primack and Corlett 2005: 34). With the exception of a few sites in the country (West 2006), conservation institutions have largely overlooked much of the region. Surprisingly, this is especially true for Porgera, considering that one of the world's largest gold mines has been in operation here for nearly twenty years, meaning that no pre-development biological inventories were ever conducted in the area. The importance of the biological diversity around Porgera was only recently discovered when researchers affiliated with Conservation International discovered 24 new species (16 plants and 8 frogs) in just 15 days of field research in 2005 (Richards 2007). Just as important, several species of birds and mammals that were thought to be localized to a few, remote sites in the country were also discovered living in Porgera, increasing the numbers and ranges of these endangered animals.

Just as Porgeran Christianity has been shaped largely in the absence of expatriate missionaries, so too have ideas about conservation in the local context. In both 1999 and 2006, different people reflected to me upon the absence of birds that had once been abundant. In the pre-colonial era (pre-1950s), white cockatoo feathers from the large populations found in Porgera were an important trade item. Cockatoos are rarely seen today. During interviews about the decline of bird life, people invariably blame the steam plumes that rise from the autoclaving process at the mine site. I asked Jerry Loa if he thought that perhaps the numbers had declined due to over-hunting and he claimed that there were still as many cockatoos as there had once been, but they avoid Porgera because 'the birds don't like the smell of chemicals in the smoke [steam plume]'. Continuing to press him about whether or not hunting might be to blame for the declines, Jerry seemed incredulous that this could ever be the case. 'Papua New Guinea is covered in thick rain forest. How could we ever kill all the birds?' he asked.

6. Papua New Guinea is comprised of the eastern half of the island of New Guinea as well as several large and small islands surrounding the main island.

Conclusion: Reconciling Religion with Conservation

Given that ecological relations in Porgera are more than just the interactions between biotic and abiotic components of the environment—that they also include spirits that mediate between biotic entities and the abiotic elements themselves—I have been concerned with understanding what role conversion to Christianity has had on how these spirits are conceptualized locally. One of the seminal monographs in environmental anthropology is *Pigs for the Ancestors* (Rappaport 1984), a book about another highland New Guinean peoples, the Tsembaga Maring, that examined the role that ritual played in regulating ecological relations between people, pigs, and land. While the Maring had not yet been missionized during the time of Rappaport's study, his work was nevertheless critiqued for neglecting political economy—'world history, global flows, and core/periphery asymmetries' (Biersack 1999: 10)—that would certainly have impacted Maring ideas of ecology and spirituality and the relationships between the two.

The environmental anthropologist Ralph Bulmer wrote in 1982 that, 'If conservation is the conscious management of resources so that yields may be sustained indefinitely, there is little evidence of it in traditional Papua New Guinea societies' (1982: 75). The data herein strongly suggest that broad characterizations of conservation practices in indigenous populations that must pertain to Western notions of conservation, such as Bulmer proposes, miss the fundamental and important aspects of environmentalism from local frameworks of perception. Moreover, the analysis of the impact of Christianity on traditional conservation practices indicates that the adoption of Christianity by indigenous populations does not inherently lead to non-conservationist ideals and practices.⁷ Perhaps a more telling indicator is linked to specific denominations and the role that individual actions take in ensuring salvation in these denominations. For instance, asking SDAs who had been Lutherans why they switched, they often reply that Lutheranism is not 'hard' enough. Being a SDA takes a greater commitment to live a worthy life according to Porgerans, and the implications of this in terms of how they view the use of forest resources could very well aid conservation efforts.

Additionally, as the Porgera case demonstrates, conservation is place and resource specific and is guided by underlying principles that are

7. There could, of course, very well be cases where most Christian denominations' support of pronatalist policies could end up resulting in threats to conservation merely from population increases and the demise of indigenous forms of family planning.

both religious (in a Christian sense) and cosmological (in indigenous terms). Moreover, there is no easy divide between Christians and non-Christians in the impacts that changing religious beliefs have on traditional ecological knowledge (cf. Fomin 2008). While Christianity provides a space for Christians and non-Christians to question traditional beliefs about forest spirits that regulate resource extraction, these spirits have gained a new saliency among Christians while diminishing in importance for non-Christians. By the same token, spirits that regulate ecology, climate, and other larger-scale forces have diminished in the eyes of Christians, while remaining important to non-Christians. In both situations, but for different reasons, traditional ideas and practices related to conservation are challenged and reshaped. As such, concepts such as domination and stewardship do not capture the subtleties of Porgeran attitudes about land, resources, and cosmological principles. However, if we hope to create a constructive space for the interaction of the beliefs and interests of communities with those of conservation organizations, we are going to have to engage with these local worldviews and moral universes that may be contrary to Western scientific understandings of ecological processes. Similarly, given the rapid, global spread of world religions like Christianity and Islam, it will be necessary to study the local, nuanced manifestations that these new religious forms exhibit in conjunction with traditional resource management ideas and practices so that we can bring local communities and conservation organizations into constructive dialogue.

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