



# Social Relations and the Green Critique of Capitalism in Melanesia

**ABSTRACT** In this article, I explore what a critical environmental perspective would look like in Melanesia, where the distinction between nature and culture, and the expectation that science interprets the former in terms of the latter, may not apply. I consider changes in scientific knowledge production and the shift from cultural ecology to political ecology in Melanesian anthropology, including the argument that Melanesians are neither conservationists nor environmentalists. In contrast, I show how people exposed to pollution from the Ok Tedi copper and gold mine in Papua New Guinea mobilize their understandings of difference in a green critique of capitalism. I examine a strategy session of local activists, a public meeting about their campaign against the mine, and a sorcery tribunal. Finally, I suggest that Melanesian ideas about social relations provide a useful ethnographic analogy for thinking about the mobility and short temporal horizons of contemporary capitalism. [Keywords: capitalism, Melanesia, mining, reverse anthropology, science]

It seems to be easier for us today to imagine the thoroughgoing deterioration of the earth and of nature than the breakdown of late capitalism; perhaps that is due to some weakness in our imaginations. —Frederic Jameson, 1994

Recent discussions of science and society point to a transformation in how scientific knowledge is produced (Gibbons et al. 1994; Nowotny et al. 2001; see also Strathern 2004). These authors use the term *Mode 1 science* to refer to disciplinary knowledge production based on relatively homogeneous processes. Participation is restricted and hierarchical, corresponding to the more traditional practices of science, such as the laboratory procedures described by Bruno Latour and Steve Woolgar (1979). Mode 1 knowledge production is based on the assumption that science and society are separate domains. The division allows for productive kinds of transactions, such as the transformation of scientific data into policy through political processes. The normative status of this model is evident in criticism of George W. Bush's presidential administration for politicizing science (Kennedy 2004; Smith 2005).

In contrast, what Helga Nowotny and colleagues (2001) call *Mode 2 science* is dispersed across different kinds of institutions and includes nontraditional participants. It is more heterogeneous, reflexive, and socially accountable. An example is the way a marginalized urban community documents its exposure to a point source of pollution (Checker

2005). In Mode 2 knowledge production, science and society are not separate domains; Nowotny and colleagues (2001) argue that this arrangement produces more socially robust forms of science.<sup>1</sup> The members of Mode 2 societies also come to reflect on themselves in scientific terms borrowed from disciplines ranging from anthropology to the life sciences: as possessing culture (Hirsch and Strathern 2004), for example, or as the expression of a particular sequence of DNA.

Anthropology has also undergone a transformation from Mode 1 to Mode 2 knowledge production, although the process has been selective, uneven, and at times contentious.<sup>2</sup> In environmental anthropology, the transformation is evident in the paradigm shift from the cultural ecology of the 1960s and 1970s (Bennett 1976; Orlove 1980) to contemporary research on political ecology (Biersack and Greenberg 2006; Blaikie 1999; Escobar 1999; Watts 2000).<sup>3</sup>

A classic example of Mode 1 knowledge production in environmental anthropology is Roy Rappaport's *Pigs for the Ancestors* (1968). The distinction between cognized models, which are shaped by culture and consequently subjective, and operational models, which are scientific and objective, reifies the Mode 1 division between science and society.<sup>4</sup> Rappaport (1968:9) describes Maring resource management as a "latent function" of their rituals rather than a consequence of conscious decision making, leading Gillian Gillison to criticize him for "driving higher reason

and communal interest into the unconscious" (2001:298).<sup>5</sup> Rappaport's emphasis on adaptation rather than agency differentiates his work from subsequent Mode 2 discussions about sustainability, which combines economic interests and environmental concerns (Brundtland 1987), and biodiversity, which infuses biology with a conservation ethic (Wilson 1992).

Rappaport's early work also illustrates how Mode 1 knowledge production separates scientific observations from the political conclusions that may be derived from them. The recognition that Maring resource use was regulated by ritual processes that conjoin the sacred and the material led to Rappaport's influential pronouncements on the preeminence of moral values in guiding human-environmental relations, which provided an important platform for the emerging environmental movement in the 1970s and 1980s (Hoey and Fricke 2007). Rappaport (1971) also drew on his analysis of Maring practices in his prescient argument that globalization may be maladaptive.

In his later work, Rappaport helped spur the transition from cultural ecology to political ecology, and from Mode 1 to Mode 2 knowledge production in environmental anthropology, through his study of risk perception and offshore oil drilling in California (Rappaport 1996) and his insistence that anthropologists engage with contemporary social problems in what he called the "anthropology of trouble" (Rappaport 1993). Political ecology emerged in response to the large-scale political and economic changes associated with globalization and the rise of environmentalism as a social movement, a Mode 2 combination. It entails a shift from the study of human adaptation to particular environments to the problems of environmental degradation caused by industrialization. Attention to the ritual regulation of ecosystems has given way to the study of contexts shaped by multiple and competing ideologies of nature, which is consistent with poststructuralist challenges to the assumption that entities like "nature" or "the person" represent discrete and stable objects (Escobar 1999; Pottage 2004; Strathern 1980, 1988). In contrast to earlier work on closed ecosystems, and consequently well-defined and stable units of analysis, political ecology addresses questions of scale that arise through globalization and the accelerated circulation of persons, things, and ideas (Biersack 2006b; Watts 2000).

These transformations are evident in contemporary research on political ecology in Melanesia and its attention to the social and environmental impacts of mining (Ballard and Banks 2003; Connell and Howitt 1991; Filer and Macintyre 2006; Kirsch 2006, 2007; Weiner and Rumsey 2004). Much of this literature seeks to explain how "the economic benefits of a dominant extractive industry sector are offset by a range of economic, social, political and environmental risks and costs that are grouped together by the concept of a 'resource curse'" (Filer and Macintyre 2006:217). Consistent with other Mode 2 contexts, expert knowledge production about mines and communities

is mobile rather than restricted to the social sciences. Anthropologists have studied these relationships in a variety of roles: as ethnographers (Biersack 2006a; Crook 2007; Halvaksz 2008; Hyndman 1994; Jacka 2005; Jorgensen 2006; Kirsch 2006), corporate consultants (Filer 1999, 2001; Strathern and Stewart 2004), and critics (Hyndman 1988; Kirsch 2002). Many anthropologists have occupied more than one of these roles, and sometimes all three. There is considerable traffic between the resulting genres of writing, which include social impact studies commissioned by mining companies, NGO reports, policy statements, and ethnography. All of these accounts are shaped by the language and practices of the social sciences, especially anthropology, which has historically been the dominant mode of representation for the region.

Interventions by anthropologists and other social scientists also influence relationships between mining companies and Melanesians. There is a "looping effect" (Hacking 1994; see also Hirsch 2001) as communities are refashioned through their engagement with mining companies. This includes the transformation of social organization and the "entification" of groups in response to the distribution of compensation (Ernst 1999; Golub 2007; Weiner 2001). New divisions may emerge as people identify themselves as supporters or opponents of mining projects (Kirsch 2007). Social and economic transformations may lead to changes in orientation from the past and one's ancestors to concerns about the members of future generations (Kirsch 1996, 2006; see also Strathern 1999:224). People may also formulate new understandings of themselves based on distinctive contrasts with the practices of mining companies (Kirsch 2001, Strathern 2004:91). To the extent that these processes are influenced by categories from the social sciences, they can be understood as Melanesian versions of Mode 2 knowledge production.

In this article, I describe how the people living downstream from the Ok Tedi copper and gold mine in Papua New Guinea mobilize their differences from the mining company for political purposes. The resulting critique of the environmental consequences of capitalism is an example of Mode 2 knowledge production that turns difference into the basis for comparative analysis. This is unlike the production and maintenance of difference that is a fundamental cultural dynamic in New Guinea, which facilitates exchange, or the postcolonial politicization of difference in the form of *kastom* (Keesing 1989), which facilitates identity politics. In the examples considered here, comparisons between mining companies and Melanesians are strategically deployed by the participants in a social movement that seeks to halt the Ok Tedi mine's destructive environmental effects. The leaders of the movement draw on their ideas about social relations to criticize the mobility of capital and corporate refusal to take responsibility for the long-term environmental consequences of the mine's operations. This corresponds with observations by David Harvey (1990) and

Aihwa Ong (1999) on the flexibility of capital, which is facilitated by its mobility, although the environmental costs of corporate mobility are at stake here rather than its effect on labor.

The strategic invocation of difference in the analysis and critique of capitalism might be compared to the way that indigenous identities and politics in the Ecuadorian Amazon are produced in the context of their struggle with the state and the oil industry (Sawyer 2004). It might be contrasted with Partha Chatterjee's (1993) search for political alternatives to the nation in India, which Ong criticizes for "the assumption that both modernity and capitalism are universal forms, against which non-Western societies can only mobilize 'pre-existing cultural solidarities'" (1999:34). Such a perspective recognizes neither Indian participation in capitalism nor their transformation of it. However, as the following examples demonstrate, engagement with the mining industry in terms of fundamental understandings associated with kinship and social relations results in a powerful critique that simultaneously identifies what people want to adopt and what they wish to change about capitalism.<sup>6</sup>

Melanesia is a particularly instructive context in which to examine these questions. Whereas science ordinarily invokes a distinction between society and nature, the universality of these categories has been challenged on the basis of ethnographic information from the region (Strathern 1980; Wagner 1977). What would a critical environmental perspective look like in a place reported to have no nature-culture distinction and consequently for which the notion of science interpreting nature in terms of culture does not seem to apply? The anthropological consensus has been that Melanesians are not environmentalists, although their rituals and taboos may have unintended conservation effects (Morauta et al. 1982; Rappaport 1968).<sup>7</sup> More recent work seems to confirm this argument, as Paige West (2006) reports in her analysis of the conflict between a conservation organization that seeks to limit development at Crater Mountain and the Gimi who expect the conservationists to bring development. Social scientists writing about mining have used these arguments to support the claim that Melanesians are more concerned about control over natural resources and compensation than the environmental effects of mining projects (Banks 2002).

In contrast, in this article I argue that exposure to pollution from the Ok Tedi copper and gold mine in Papua New Guinea has caused people to reflect on environmental issues in novel ways (see Banks and Ballard 1997; Crook 2004; Hyndman 2001; Kirsch 2006, 2007). I examine how people from several sociolinguistic communities affected by the Ok Tedi mine evaluate the actions of the mining company in a series of interconnected events: a strategy session held by local activists, a public meeting about their campaign against the mine, and a sorcery tribunal involving claims about their lawsuit against the mining company. I also describe how these discussions invoke local understandings of the risks associated with ending social relations. In contrast

to previous ethnographic research in Melanesia, which does not report evidence of a critical environmental perspective, I show how differences in social relations are mobilized in response to the mining company, and I argue that this forms the basis of a green critique of capitalism.

## OPPOSITION TO THE ENVIRONMENTAL IMPACTS OF THE OK TEDI MINE

Local opposition to the environmental impacts of the Ok Tedi mine attracted international attention in 1994 when a major lawsuit was filed against Broken Hill Proprietary Ltd. (BHP), the majority shareholder and managing partner of the Ok Tedi mine. The suit was lodged in the Supreme Court of Victoria in Melbourne, Australia, where BHP is incorporated. At issue were the problems caused by discharging 30 million metric tons of tailings (the fine particles that remain after the valuable ore has been extracted) and 40 million metric tons of waste rock into local rivers annually since 1986. The lawsuit was settled out of court in 1996 for an estimated \$500 million in compensation and commitments to tailings containment, although subsequent efforts to enforce compliance with the environmental provisions of the agreement were unsuccessful (Kirsch 2007).

When BHP announced its decision to withdraw from the Ok Tedi mine after managing the project for more than two decades, it acknowledged that the impacts of the mine were far greater than previously predicted (Economist 1999).<sup>8</sup> The legacy of BHP's management of the mine includes the destruction of 1,500 square kilometers of rain forest, an area that is expected to double in the coming decades (Ok Tedi Mining Ltd. [OTML] 2005:4). Fish populations in the Ok Tedi and Fly rivers are severely depleted, and most of the birds that used to live along the river corridor have migrated (Parametrix, Inc., and URS Greiner Woodward Clyde 1999). Fertile garden land and sago stands are buried beneath tailings and other mine wastes. The river system faces another potential threat from acid mine drainage, which has the capacity to render large areas inhospitable to organic life for extended periods of time (OTML 2005:12), although the mining company has announced plans to separate and store the acid-generating material underground (Wu 2006:5).

In 2001, BHP merged with a South African competitor to become BHP Billiton, the world's largest mining company, although the people in Western Province still refer to the company as BHP. In 2002, BHP Billiton transferred its 52 percent share in the Ok Tedi mine to a trust fund in Singapore; revenue from the PNG Sustainable Development Program Ltd. will be invested in development projects in Papua New Guinea (Crook 2004; Mining Journal 2002). With continued high prices for copper and gold, the fund may earn \$1 billion in royalties by the anticipated closure date of the mine in 2012. However, the leaders of the campaign against the Ok Tedi mine continue to challenge the legitimacy of BHP Billiton's departure from the project and

argue that the company remains responsible for the mine's ongoing environmental impact.

These views were expressed during a three-day meeting held in 2005 in the town of Kiunga on the Fly River (Kirsch 2007), where copper and gold is loaded onto ships bound for Southeast Asia and Europe. Billed as the first "summit meeting" to bring together the communities affected by the mine, more than 300 people participated in discussions about the history of their legal struggle, the impact of pollution on their resources and subsistence practices, their objections to how the trust fund is managed, and the shortage of economic opportunities in the region. At issue was their shared future along the Ok Tedi and Fly rivers and political and legal strategies of recourse against OTML, the Papua New Guinea government, and BHP Billiton. The rationale for the summit was to promote discussion of their options after the failure of their second court case against BHP Billiton, which charged the corporation with breach of the 1996 settlement agreement for continuing to discharge mine tailings into the river system. The summit meeting was also intended to redress serious divisions in the communities affected by the mine caused by a set of legal contracts known as the Community Mine Continuation Agreements, or CMCAs, as I discuss below.

Late one evening while compiling the resolutions from the regional summit, a man from the middle Fly region said to me,

We know you think that BHP is gone. But as Papua New Guineans, we can't accept that. We see BHP's influence on the decisions being made by the mine and the trust company. And regardless of what BHP says about not being involved in the mining company, we hold them responsible for everything that happens.

The other people in the room immediately agreed with his assertions, contrasting their own understandings of social relations "as Papua New Guineans" with the practices of the mining company. Despite their familiarity with the act of parliament that facilitated BHP Billiton's exit from the country, they rejected the underlying "capital logic" (Gerritsen and Macintyre 1991) that permitted a multinational company to walk away after causing extensive damage to one of Papua New Guinea's major river systems.

These comments illustrate how Melanesian ideas about social relations and difference are deployed in their critique of capitalism, especially how corporations exploit their mobility to evade the long-term environmental consequences of their actions.<sup>9</sup> Questioning the legitimacy of BHP Billiton's departure from the Ok Tedi mine is appropriate given that the build-up of sediment, flooding, and deforestation are expected to continue for 60 years on the lower Ok Tedi River and 250 years along portions of the Fly River. What does it mean for BHP Billiton to leave Papua New Guinea when the environmental impacts from its mining project must be measured in decades and centuries, affecting multiple generations of people along the river, both the living and their future descendants? How do people

living along the Ok Tedi and Fly rivers make sense of this contradiction, and what might be learned from their analysis of capitalism?

## ENDING SOCIAL RELATIONS IN MELANESIA

Exchange practices have long been central to the ways that Melanesians and Euro-Americans conceptualize their differences, from barter in Fiji (Sahlins 1993; Thomas 1992) to cargo cults in New Guinea (Lawrence 1964; Wagner 1981). Writing about Indo-Fijian relations, Hirokazu Miyazaki (2005) refers to the "extensibility of the gift" in describing two historical moments during which the invitation to participate in indigenous Fijian gift giving had important political ramifications. Miyazaki's notion of extensibility suggests how gift giving, and the kinds of social relations that underlie the gift, might be politically scaled up. In the present context, ideas about the risks associated with ending social relations are scaled up in a critique of the mobility and short temporal horizons of capitalism.

Anthropologists writing about social relations in Melanesia explain how the person is not understood as a stable, bounded figure but, rather, as a set of relationships (Strathern 1988; Wagner 1991). Persons become composed of other persons through exchange. Whereas I have previously described how Melanesians strive to "keep the social network in view" (Kirsch 2001), in the following examples, I consider the inverse process: what it means to end social relations in Melanesia. It is the mobilization of these ideas, what Miyazaki (2005) would call their extensibility, that forms the basis of the response to the mining company that I examine here.

I begin where it might be assumed that relationships inevitably end: at death. In many Melanesian societies, death triggers a series of mortuary transactions (Barraud et al. 1994; Damon and Wagner 1989; Foster 1995). Among the Yonggom, claims for compensation known as *bop kibi* are levied against the estate of the deceased on the basis of prior transactions, including contributions to bridewealth and relationships between long-term exchange partners (Kirsch 2006:92–94). Recipients of these payments are expected to return a portion of whatever is transacted at a later date, often as much as half of its value, ensuring that the original relationship will continue in another form. In Robert Foster's (1995) terms, "finishing the dead" through exchange results in their replacement. Relationships do not end with death but are transformed into other social relations.

Another context in which relationships may end is divorce. Anthropologists working in Melanesia explain relatively low divorce rates with reference to complicated negotiations over the return of bridewealth and the future allegiance of children (Strathern 1972:168–169). There are also restricted grounds for claiming divorce in many societies and strong social sanctions against it (Kelly 1977:257). Although a variety of factors associated with modernization may lead to higher divorce rates (Meggitt 1969:7), inflated

bridewealth payments can make divorce more difficult for women to obtain (Wardlow 2006:13).

The Yonggom terms for divorce are *domoni*, which means to relinquish, and *dankorare*, which refers to the separation of two things previously combined.<sup>10</sup> Divorce is relatively rare and requires social legitimacy, and my informants referred to both adultery and violence as problems that might result in divorce. The most common cause of divorce is *bun*, which refers to both the trigger in a trap and comments or behavior that initiates a conflict. The most serious form of *bun* occurs when a woman complains to her brother about her husband's behavior, compelling her sibling to act on her behalf. She does not even have to verbalize her concerns; simply to approach her brother in tears is enough to provoke a response. The person who causes the *bun* is held responsible for its consequences; in this case, the sister would be blamed if her husband subsequently experienced misfortune.

In contrast to marriage and divorce, casual friendships may end without much ado. The friends of someone who engages in socially inappropriate (and therefore potentially dangerous) behavior will be advised to stay away from that person. They should not confront their friend, or explain the reasons for their avoidance, as that would be *bun*, the trigger for a negative response. Instead, they should let the other person know their feelings gradually by modifying their behavior. My informants explain that actions speak where words cannot.<sup>11</sup>

To end a close relationship, however, both parties must formally declare that they are enemies (*bon karup*).<sup>12</sup> This is considered dangerous and afterward the two men must avoid each other until death. The only way to reverse a declaration of enmity is for one man to compensate the other, although competing interpretations of the offending event may prevent this from occurring. After paying compensation, the two men who were sworn enemies share a meal and burn *at wiim denek*, the tree resin once used for illumination at night.

These descriptions convey the value the Yonggom place on perpetuating relationships and the risks associated with ending them. In emotional terms, feelings of sorrow and loss (*mimiyop*) are described as strongest when a relationship ends, whereas feelings of fulfillment (*kube*) are greatest when a relationship is reestablished after a long separation (Kirsch 2006:112, 234, n. 8). An example of how these ideas are applied to their relationship with the mining company was shared with me by a man from West Ningerum who described standing up at a meeting with the provincial governor to express his deep dissatisfaction with the mining company by declaring: "I am divorcing Ok Tedi [Mining Ltd.]" His performative utterance can only be understood with reference to the social significance of divorce and the dangers of publically repudiating a relationship.<sup>13</sup> Already an outspoken critic of the mining company, the provincial governor subsequently challenged the project in a new lawsuit in the Papua New Guinea courts, as I discuss below.

However, it is unlikely that the expatriate managers of the mining company would have grasped the full significance of the idiom.

### "REVERSE ANTHROPOLOGY" AND THE MOBILIZATION OF DIFFERENCE

Among the resolutions of the Kiunga summit meeting was a call to overturn the Eighth Supplemental Agreement between the Independent State of Papua New Guinea (1995), BHP, and OTML. The agreement gave legal force to the CMCAs, which were signed in the villages along the Ok Tedi and Fly rivers during the second phase of litigation against BHP. It included a clause certifying that any signatory to the CMCAs binds the members of his or her village to the agreement. This provided BHP with an expeditious means of establishing legal agreements with the 40,000 people affected by the mine. However, the CMCAs also helped BHP to undermine litigation in the Supreme Court of Victoria by forcing the people affected by the mine to choose between the lawsuit and additional compensation promised by the mining company.

The CMCAs also had a divisive effect on the communities downstream from the mine. Local critics of the agreements accused the signatories of acting without their consent and against their interests. A number of persons who signed the agreements became outcasts in their natal villages and were forced to resettle in urban areas. I heard some of these grievances expressed during a Yonggom ritual called *at kawenepi* held in one of the villages on the Ok Tedi River in August of 2006 (see Kirsch 2006:168–170). *At kawenepi* refers to standing on a tree stump to address a crowd, the Yonggom equivalent of a "stump speech." The participants in the ritual discuss a particular illness or death, which is assigned a social cause through sorcery accusations. The adults from the village and guests from several neighboring villages and the town of Kiunga attended the event, which was focused on the failing health of the man who signed the CMCAs on behalf of the village. At this particular event, the family of the patient distributed copies of a typed list of talking points to the assembled crowd, who queued up to address the issues. The discussion lasted from morning until dusk.

The first topic was a dispute about land ownership. The second item on the agenda was concerned with the payment of bridewealth for the patient's wife. Disputes about exchange such as these are standard fare in the analysis of the motives for an act of sorcery. However, nearly all of the remaining topics on the list were directly related to the settlement of the lawsuit, the payment of compensation by the mining company, and the patient's role in signing the CMCAs. The talking points referred to the fact that the patient "switched sides" from plaintiff in the lawsuit to signatory of the compensation agreement. One of the speakers speculated that the change in affiliation might have provoked the anger of someone who had worked on the court case. A reference to the local NGO that helped to coordinate the

legal proceedings was quickly rebutted by one of its representatives, who had come to the village to participate in the event.

A related hypothesis was that the sorcery was triggered by anger about the CMCAs, which divided the community. Here the body of the patient bears the burden of the rift in the body politic. The speakers used the term *ambotdanggi* to describe the patient's role in the dispute, which ordinarily refers to the person who leads an assault sorcerer (*kumka*) into a settlement to kill someone. The *ambotdanggi* is familiar with the intimate details of the prospective victim's life and conveys this information to the sorcerer. The signatories to the CMCAs were compared to *ambotdanggi* because they brought the mining company into their midst. Other hypotheses discussed during the regional tribunal referred to the patient's handling of compensation paid by the mining company, including a failed housing scheme directed by one of his sons.

For the Yonggom, sorcery is the consequence of a failed exchange relationship, which prompts the offended party to seek revenge. Elsewhere, I refer to practices like the at kawenepi tribunal as examples of "reverse anthropology" following Roy Wagner's (1981) description of cargo cults and their engagement with capitalism as the interpretive counterpart to anthropology (Kirsch 2006). Another example of reverse anthropology is the Yonggom analogy between sorcery and mining. A variety of misfortunes that would previously have been attributed to sorcery—including a leg broken by a falling tree, a fatal canoe accident, and a finger that had to be amputated—were explained in terms of pollution from the mine. The resulting compensation claims were intended to hold the mine morally accountable for its affects on the people living downstream, demonstrating that pollution is a kind of social relation (Kirsch 2006:129). These indigenous modes of analysis interpret events in terms that are locally meaningful. They can be distinguished from the other examples considered here that involve the extensibility or political mobilization of social relations in an explicitly comparative manner.

#### FROM SOCIAL RELATIONS TO LEGAL LIABILITY

During the 2005 summit meeting in Kiunga, many of the speakers identified BHP and Australia as their enemies. One person said that if BHP returned to restore the river and pay compensation, then he would make peace with them. Another told me that "Australia is our enemy. By escaping he lost the battle and is not [strong] enough to face [the consequences]; he is defeated. But he inflicted casualties on us." These claims are modeled after the formal declaration of enmity described above; the people attending the meeting vowed that their conflict with BHP and Australia would not end unless and until BHP returns to clean up the pollution and compensate them for the full value of their losses (see Kirsch 2007:312–313).<sup>14</sup>

These ambitions may seem impractical given that BHP Billiton left the country in 2002. However, the assertion that BHP Billiton continues to influence the management of the mine is correct. BHP Billiton nominates three of the seven members of the board of directors for the Singapore trust, one of whom also serves on the OTML board of directors (PNG Sustainable Development Program Ltd. 2008). When important decisions are made at the mine, such as policies governing mine closure, BHP Billiton is consulted for input. Although BHP Billiton influences policy decisions at the mine, it is no longer accountable for the mine's environmental impacts. However, new legal action challenges the legitimacy of this relationship.

After the 2005 summit meeting in Kiunga, signatures were collected for a petition calling on the government to review its agreements with BHP Billiton and OTML. The organizers decided that everyone who signed the petition should march through the mining township of Tabubil and formally present the document to the managing director of the Ok Tedi mine. Although the mining executive agreed to meet with them, he simultaneously asked the national government to send a mobile police squad to protect the mine. Worried that a confrontation with the police might "get out of hand," the organizers cancelled the protest.

These events, from the summit meeting to the hastily cancelled march, convinced the governor of Western Province to fund a legal challenge to the Eighth Supplemental Agreement, which is being presented before the Supreme Court of Papua New Guinea. The case also challenges the Ninth Supplemental Agreement, which established the terms of BHP Billiton's departure from Papua New Guinea, including the transfer of its shares in OTML to the PNG Sustainable Development Program Ltd., in return for a waiver of environmental liability, indemnifying BHP Billiton against any future legal action (Independent State of Papua New Guinea 2001). A finding that these agreements are unconstitutional would invalidate the CMCAs, presenting an opportunity to negotiate a new series of agreements with the mining company. As the governor explained during an interview in 2006, one of the priorities for his second term in office (he was successfully reelected in June of 2007) is renewed attention to the environmental problems caused by the mine. Invalidating the agreements between the state and the mining company might also provide an opportunity to reassess BHP Billiton's liability for the environmental impact of the mine in the courts of Papua New Guinea. In this context, the extensibility of social relations takes the form of legal liability.

#### MELANESIAN CONTRIBUTIONS TO THE GREEN CRITIQUE OF CAPITALISM

In *Timescapes of Modernity*, Barbara Adam (1998) addresses the need to reconcile the short-term temporal orientation of capital with the long-term environmental impacts of industrialization. She describes the economic conventions that discount the value of the future. There is little long-term

thinking beyond the market, which ignores environmental processes operating at other temporal scales. Adam also explains how the assumption of reversibility inherent in Newtonian physics encourages environmental risk taking rather than adherence to the precautionary principle. Mining and other industrial processes produce environmental problems that not only affect the present but also compromise the future, although decision making about these impacts is “abdicated to science and transnational corporations, neither of which are socially and politically accountable for their deeds” (Adam 1998:15). In contrast, Yonggom ideas about keeping social relations (and responsibilities) in view and their attention to social reproduction can help make visible the long-term social and environmental consequences of industrial modes of production.

The experiences of the people exposed to pollution from the Ok Tedi mine suggest the need to think in alternative temporal scales, including the requirements of reproducing society (Weiner 1980) and transmitting cultural knowledge across generations. Yonggom ideas about generational change are conveyed in discourse about the *aman dana*, the children of the future.<sup>15</sup> Older people express concern that children are growing up without the skills needed for survival in the rain forest; that young people do not know the names of the birds and other animals that once lived in their forests and rivers and are the characters in their most sacred myths; and that some youths resent the hard labor entailed in gardening and making sago. The Yonggom are also concerned about the loss of important cultural knowledge (Kirsch 2006).

Yonggom narratives about the effects of mining have recently taken the form of fatalistic commentaries on contemporary life. In a discussion with several long-term informants in the town of Kiunga in August of 2006, one person told me that, because of the mine, the current generation has “no life” and “whatever we do [in protest against the mine], we are finished.” Another person echoed this sentiment by saying “we are destroyed.” The other people present expressed their agreement. This does not mean that the Yonggom have given up seeking change but, rather, reflects their commitment to the *aman dana* and their recognition that, as one person concluded, “we have to sacrifice our own lives on behalf of future generations.” These sentiments correspond with the emphasis the Yonggom place on social relations rather than individual persons and illustrate the extensibility of these relationships into the future. Their comments also suggest that reconciling the interests of future generations with their own may require changes to the environmental status quo.

Yonggom ideas about social relations present an alternative to what sociologists call ecological modernization theory (Buttel 2000; York and Rosa 2003), the argument that continued industrial development and technological innovation will solve contemporary environmental problems. The dilemmas of the present will be resolved by technology not yet invented: toxic waste and radioactiv-

ity will be neutralized through technological innovation, resource management will restore degraded natural systems, and genetic technologies will permit the modification of plants and animals in response to environmental problems. However, new environmental problems are continually being created even though they may not become visible until the future. These problems will require subsequent interventions, reproducing the fundamental paradox indefinitely.<sup>16</sup> The critics of ecological modernization theory question the wisdom of deferring the solution of environmental problems to the future and ask whether they can be adequately resolved by technological means alone (Adam 1998; Melucci 1998).<sup>17</sup> As indicated by their compensation claims against the Ok Tedi mine, the Yonggom treat pollution as evidence of a troubled social relationship rather than a technological problem. Similarly, their ideas about the future are reflexively concerned about social relations and the *aman dana* rather than endlessly deferred to technology as proposed by ecological modernization theory.

## CONCLUSION

In this article, I examine a critical environmental perspective that depends on neither the categories of nature and culture nor the mediating role of science. The critique arises in the context of Mode 2 knowledge production associated with the mining industry, and the deployment of social science categories by ethnographers, mining company consultants, and NGOs. In this context, local activists strategically compare differences in social relations as a way of addressing the environmental problems caused by the Ok Tedi mine. The extensibility of their ideas about social relations forms the basis of their critique of the mobility and short temporal horizons of contemporary capitalism.

Alain Pottage (2001, 2004) contrasts Melanesian indifference to the distinction between persons and things to legal arguments that assume the validity of these categories. This provides a useful analogy in the context of questions presented by developments in the life sciences, such as the status of a fertilized egg as person or property (see Strathern 1999). Similarly, this discussion of the political ecology of mining identifies an ethnographic analogy between Melanesian and capitalist ideas about social relations, although in this case the comparison was invoked by people affected by the Ok Tedi mine rather than the analyst. At issue in these examples is the attempt to hold the mining company socially accountable and legally liable for its actions, the desirability of recognizing processes that operate on longer temporal scales (e.g., in generational terms), and the problem of relying on technological innovation rather than formulating social solutions to environmental problems. Like the extensibility of gift giving that Miyazaki (2005) describes for ethnic politics in Fiji, attention to the risks entailed in ending social relations scale up in the efforts of the Yonggom and their neighbors to hold BHP

Billiton responsible for the environmental impact of the Ok Tedi mine.

As Frederic Jameson (1994:xii) suggests in the epigraph to this article, there is an urgent need to understand why the destructive environmental consequences of capitalism appear inevitable. Melanesian ideas about social relations and the resulting critique of capitalism challenge the mobility of capital and its ability to evade the long-term environmental consequences of its actions. The protests against the Ok Tedi mine also raise important questions about the messianic aspect of free market imaginaries, which persuade countries to remake their national image in the same terms (Sunder Rajan 2006:232; see also Comaroff and Comaroff 2000). They reveal the paradox of the “resource curse” (Ross 1999), in which mining companies, despite promising to improve the material conditions of living, may impoverish people by destroying the foundations of their economy and livelihood. This has sparked national debate in Papua New Guinea about the wisdom of relying on revenue from natural resource extraction at the risk of compromising the survival of “future generations” (Post Courier 2007).<sup>18</sup> The extensibility of Melanesian ideas about social relationships and responsibilities to their interactions with the mining industry suggests valuable new ways to imagine the relationship between capitalism and the environment.

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## NOTES

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1. Although, as Marilyn Strathern (2000:297) notes, neither Mode 1 nor Mode 2 knowledge production can be understood as “politically innocent.”
2. The Yanomami debates (Borofsky et al. 2005) might be understood as a clash between Mode 1 and Mode 2 knowledge production.
3. See Andrew Vayda and Bradley Walters (1999) for criticism of the shift to Mode 2 knowledge production in political ecology.
4. However, Aletta Biersack astutely observes that “cognized models are among the causes of reality that operational models strive to depict” (1999:14).
5. For example, the model largely ignores women's understandings of how people compete with pigs for sweet potatoes when their herds become too large (see Biersack 1999:15, n. 3).
6. Jerry Jacka (2007:467) makes a similar observation about the “simultaneous acceptance and critique of recent cultural transformations” in the Highlands of Papua New Guinea.
7. See Michael Harkin and David Lewis (2007) on comparable debates in North America.

8. The mining company's acknowledgement corresponds with Ulrich Beck's observation that “the very people who predict, develop, test and explore possibilities of economic utility with all the tricks of the trade, always fight shy of risks and are then deeply shocked and surprised at their ‘unforeseen’ or even ‘unforeseeable’ arrival” (1992:60).
9. Similarly, Ira Bashkow describes the “deep moral ambivalence” that the Orokaiva feel toward the “lightness” and resulting mobility of Euro-Americans who are “unburdened by the heavy reciprocities and obligations of kinship” (2006:65).
10. The term applies to both persons and things; for example, *dankorare* can also refer to skinning the bark from a tree.
11. An example of how actions are more important than words was provided by an informant who observed that there are no terms for gratitude or apology in Yonggom language, as these sentiments must be demonstrated to be genuine.
12. My informants reported that there was no Yonggom equivalent to the Tangu practice of *mngwotngwotiki*, in which two parties decide by “free and mutual consent neither to trade, nor to exchange, nor cooperate” (Burrige 1960:58).
13. See Robert Welsch's (1994) comparison of social organization among the Yonggom and the neighboring Ningerum.
14. BHP Billiton reported record earnings of \$13.4 billion in 2007 (*New York Times* 2008).
15. As Ulrich Beck notes, “In the risk society, the past loses the power to determine the present. Its place is taken by the future” (1992:34).
16. Like all resources distributed by the market, technological solutions to pollution will not be immediately accessible to everyone, or equitably distributed, and consequently it is unlikely that they will be able to keep pace with the creation of new environmental hazards.
17. Alberto Melucci argues that “the expectation that the society of the future would resolve the contradictions of present society was the great myth and the great hope of industrial society: a still not entirely socialized time and space fueled the project of capitalist-industrial conquest” (1998:428). He suggests that the limitations of this perspective are made visible by social movements like the campaign against the Ok Tedi mine.
18. A recent editorial about mining in the *Post Courier* of Papua New Guinea asks: “What will be the environmental cost and the cost of socio-economic security for future generations” of dependence on minerals extraction and concludes that the “policy implication of risking human survival on the increased acceleration of the exploitation of the natural environment is far too important to be left to politicians” (Post Courier 2007).

## REFERENCES CITED

- Adam, Barbara  
1998 *Timescapes of Modernity: The Environment and Invisible Hazards*. New York: Routledge.
- Ballard, Chris, and Glenn Banks  
2003 Resource Wars: The Anthropology of Mining. *Annual Review of Anthropology* 32:287–313.
- Banks, Glenn  
2002 Mining and the Environment in Melanesia: Contemporary Debates Reviewed. *Contemporary Pacific* 14(1):39–67.
- Banks, Glenn, and Chris Ballard, eds.  
1997 *The Ok Tedi Settlement: Issues, Outcomes and Implications*. Pacific Policy Paper, 27. Canberra: National Centre for Development Studies and Resource Management in Asia-Pacific, The Australian National University.
- Barraud, Cécile, Daniel deCoppet, André Iteanu, and Raymond James  
1994 *Of Relations and the Dead: Four Societies Viewed from the Angle of Their Exchanges*. Oxford: Berg.
- Bashkow, Ira  
2006 *The Meaning of Whitemen: Race and Modernity in the Orokaiva Cultural World*. Chicago: University of Chicago Press.
- Beck, Ulrich  
1992 *Risk Society: Towards a New Modernity*. Mark Ritter, trans. London: Sage.



- Bennett, John W.  
1976 Anticipation, Adaptation, and the Concept of Culture in Anthropology. *Science* 192(4242):847–853.
- Biersack, Aletta  
1999 Introduction: From the “New Ecology” to the New Ecologies. *American Anthropologist* 101(1):5–18.  
2006a Red River, Green War: The Politics of Place along the Porgera River. *In* *Reimagining Political Ecology*. Aletta Biersack and James B. Greenberg, eds. Pp. 233–280. Durham, NC: Duke University Press.  
2006b Reimagining Political Ecology: Culture/Power/History/Nature. *In* *Reimagining Political Ecology*. Aletta Biersack and James B. Greenberg, eds. Pp. 3–42. Durham, NC: Duke University Press.
- Biersack, Aletta, and James B. Greenberg, eds.  
2006 *Reimagining Political Ecology*. Durham, NC: Duke University Press.
- Blaikie, Piers  
1999 A Review of Political Ecology: Issues, Epistemology and Analytical Narratives. *Zeitschrift für Wirtschaftsgeographie* 42(3–4):131–147.
- Borofsky, Robert, with Bruce Albert, Raymond Hames, Kim Kill, Lêda Leitão Martins, John Peters, and Terence Turner  
2005 *Yanomami: The Fierce Controversy and What We Can Learn from It*. Berkeley: University of California Press.
- Brundtland, G. H., ed.  
1987 *Our Common Future: The World Commission on Environment and Development*. Oxford: Oxford University Press.
- Burridge, Kenelm  
1960 *Mambu: A Melanesian Millennium*. London: Methuen.
- Buttel, Frederick H.  
2000 Ecological Modernization as Social Theory. *Geoforum* 31(1):57–65.
- Chatterjee, Partha  
1993 *The Nation and Its Fragments: Colonial and Postcolonial Histories*. Princeton: Princeton University Press.
- Checker, Melissa  
2005 *Polluted Promises: Environmental Racism and the Search for Justice in a Southern Town*. New York: New York University Press.
- Comaroff, Jean, and John L. Comaroff  
2000 Millennial Capitalism: First Thoughts on a Second Coming. *Public Culture* 12(2):291–343.
- Connell, John, and Richard Howitt, eds.  
1991 *Mining and Indigenous Peoples in Australasia*. Sydney: University of Sydney Press.
- Crook, Tony  
2004 Transactions in Perpetual Motion. *In* *Transactions and Creations: Property Debates and the Stimulus of Melanesia*. Eric Hirsch and Marilyn Strathern, eds. Pp. 110–131. New York: Berghahn.  
2007 Machine-Thinking: Changing Social and Bodily Divisions around the Ok Tedi Mining Project. *In* *Embodying Modernity and Postmodernity: Ritual, Praxis, and Social Change in Melanesia*. Sandra C. Bamford, ed. Pp. 69–104. Durham, NC: Carolina Academic Press.
- Damon, Frederick H., and Roy Wagner, eds.  
1989 *Death Rituals and Life in the Societies of the Kula Ring*. DeKalb, IL: Northern Illinois University Press.
- Economist, The  
1999 Mea Copper, Mea Culpa: Australia’s Broken Hill Proprietary May Pull out of New Guinea. *The Economist*, August 21: 58.
- Ernst, Thomas M.  
1999 Land, Stories, and Resources: Discourse and Entification in Onabasulu Modernity. *American Anthropologist* 101(1):88–97.
- Escobar, Arturo  
1999 After Nature: Steps to an Antiessentialist Political Ecology. *Current Anthropology* 40(1):1–16.
- Filer, Colin  
2001 The Dialectics of Negation and Negotiation in the Anthropology of Mineral Resource Development. *In* *The Anthropology of Power: Empowerment and Disempowerment in Changing Structures*. Angela Cheater, ed. Pp. 88–102. New York: Routledge.
- Filer, Colin, ed.  
1999 *Dilemmas of Development: The Social and Economic Impact of the Porgera Gold Mine, 1989–1994*. Canberra: Asia-Pacific.
- Filer, Colin, and Martha Macintyre  
2006 Grass Roots and Deep Holes: Community Responses to Mining in Melanesia. *The Contemporary Pacific* 18(2):215–231.
- Foster, Robert J.  
1995 *Social Reproduction and History in Melanesia: Mortuary Ritual, Gift Exchange, and Custom in the Tanga Islands*. Cambridge: Cambridge University Press.
- Gerritsen, Rolf, and Martha McIntyre  
1991 *Dilemmas of Distribution: The Misima Gold Mine, Papua New Guinea*. *In* *Mining and Indigenous Peoples in Australia*. John Connell and Richard Howitt, eds. Pp. 35–54. Sydney: Sydney University Press.
- Gibbons, Michael, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott, and Martin Throw  
1994 *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. London: Sage.
- Gillison, Gillian  
2001 Reflections on Pigs for the Ancestors. *In* *Ecology and the Sacred: Engaging the Anthropology of Roy A. Rappaport*. Ellen Messer and Michael Lambek, eds. Pp. 291–299. Ann Arbor: University of Michigan Press.
- Golub, Alex  
2007 From Agency to Agents: Forging Landowner Identities in Porgera. *In* *Customary Land Tenure and Registration in Australia and Papua New Guinea: Anthropological Perspectives*. James Weiner and Katie Glaskin, eds. Pp. 73–96. Canberra: The Australian National University Press.
- Hacking, Ian  
1994 The Looping Effects of Human Kinds. *In* *Causal Cognition: A Multidisciplinary Approach*. Dan Sperber, David Premack, and Ann James Premack, eds. Pp. 351–394. Oxford: Clarendon.
- Halvaksz, János, Alex, II  
2008 Whose Closure? Appearances, Temporality, and Mineral Extraction in Papua New Guinea. *Journal of the Royal Anthropological Institute* 14(1):21–37.
- Harkin, Michael E., and David Rich Lewis, eds.  
2007 *Native Americans and the Environment: Perspectives on the Ecological Indian*. Lincoln: University of Nebraska Press.
- Harvey, David  
1990 *The Condition of Postmodernity*. Oxford: Basil Blackwell.
- Hirsch, Eric  
2001 Making Up People in Papua. *Journal of the Royal Anthropological Institute* 7(2):241–256.
- Hirsch, Eric, and Marilyn Strathern, eds.  
2004 *Transactions and Creations: Property Debates and the Stimulus of Melanesia*. Oxford: Berghahn.
- Hoey, Brian A., and Tom Fricke  
2007 “From Sweet Potatoes to God Almighty”: Roy Rappaport on Being a Hedgehog. *American Ethnologist* 34(3):581–599.
- Hyndman, David  
1988 Melanesians Resisting Ecocide and Ethnocide: Transnational Mining Projects and the Fourth World on the Island of New Guinea. *In* *Tribal Peoples and Development Issues: A Global Overview*. John Bodley, ed. Pp. 281–298. Mountain View, CA: Cummings.  
1994 *Ancestral Rain Forests and the Mountain of Gold: Indigenous Peoples and Mining in New Guinea*. Boulder, CO: Westview.  
2001 Academic Responsibilities and Representation of the Ok Tedi Crisis in Postcolonial Papua New Guinea. *The Contemporary Pacific* 13(1):33–54.
- Independent State of Papua New Guinea  
1995 *Mining (Ok Tedi Restated Eighth Supplemental Agreement) Act 1995*.  
2001 *Mining (Ok Tedi Mine Continuation Ninth Supplemental Agreement) Act 2001*.
- Jacka, Jerry K.  
2005 *Emplacement and Millennial Expectations in an Era of Development and Globalization: Heaven and the Appeal of*

- Christianity for the Ipili. *American Anthropologist* 107(4): 643–653.
- 2007 Whitemen, the Ipili, and the City of Gold: A History of the Politics of Race and Development in Highlands New Guinea. *Ethnohistory* 54(3):445–472.
- Jameson, Frederic  
1994 *The Seeds of Time*. New York: Columbia University Press.
- Jorgensen, Dan  
2006 Hinterland History: The Ok Tedi Mine and Its Cultural Consequences in Telefolmin. *The Contemporary Pacific* 18(2):233–263.
- Keesing, Roger  
1989 *Creating the Past: Custom and Identity in the Contemporary Pacific*. *The Contemporary Pacific* 1(1–2):19–42.
- Kelly, Raymond C.  
1977 *Etoro Social Structure: A Study in Structural Contradiction*. Ann Arbor: University of Michigan Press.
- Kennedy, Robert F., Jr.  
2004 The Junk Science of George Bush. *The Nation*. March 8. Electronic document, <http://www.thenation.com/doc/20040308/kennedy>, accessed June 15.
- Kirsch, Stuart  
1996 Return to Ok Tedi. *Meanjin* 55(4):657–666.  
2001 Property Effects: Social Networks and Compensation Claims in Melanesia. *Social Anthropology* 9(2):147–163.  
2002 Anthropology and Advocacy: A Case Study of the Campaign against the Ok Tedi Mine. *Critique of Anthropology* 22(2):175–200.  
2006 Reverse Anthropology: Indigenous Analysis of Social and Environmental Relations in New Guinea. Stanford: Stanford University Press.  
2007 Indigenous Movements and the Risks of Counterglobalization: Tracking the Campaign against Papua New Guinea's Ok Tedi Mine. *American Ethnologist* 34(2):303–321.
- Latour, Bruno, and Steve Woolgar  
1979 *Laboratory Life: The Social Construction of Scientific Facts*. Beverly Hills: Sage.
- Lawrence, Peter  
1964 *Road Belong Cargo: A Study of the Cargo Movement in the Southern Madang District, New Guinea*. Manchester: Manchester University Press.
- Meggitt, Mervyn J.  
1969 Introduction. In *Pigs, Pearlshells, and Women: Marriage in the New Guinea Highlands*. Robert M. Glasse and Mervyn J. Meggitt, eds. Pp. 1–15. Englewood Cliffs, NJ: Prentice-Hall.
- Melucci, Alberto  
1998 Third World or Planetary Conflicts? In *Cultures of Politics, Politics of Culture: Re-Visioning Latin American Social Movements*. Sonia E. Alvarez, Evelina Dagnino, and Arturo Escobar, eds. Pp. 422–429. Boulder, CO: Westview.
- Mining Journal, The  
2002 BHP Billiton Finally Out of Ok Tedi. *The Mining Journal*. Electronic document, [http://web.lexis-nexis.com/universe/document?f2ac0d8620b81bf6334604d54ee051fb&\\_docnum1&wchpdGLbVlz-zSKVb&\\_md5fab5ce23fded663c148e41cca3410c88](http://web.lexis-nexis.com/universe/document?f2ac0d8620b81bf6334604d54ee051fb&_docnum1&wchpdGLbVlz-zSKVb&_md5fab5ce23fded663c148e41cca3410c88), accessed July 10, 2007.
- Miyazaki, Hirokazu  
2005 From Sugar Cane to “Swords”: Hope and the Extensibility of the Gift in Fiji. *Journal of the Royal Anthropological Institute* 11(2):277–295.
- Morauta, Louise, John Pernetta, and William Heaney, eds.  
1982 *Traditional Conservation in Papua New Guinea: Implications for Today*. Monograph 16. Boroko, PNG: Institute of Applied Social and Economic Research.
- New York Times  
2008 BHP Billiton Ltd. Electronic document, [http://topics.nytimes.com/top/news/business/companies/bhp\\_billiton\\_ltd/](http://topics.nytimes.com/top/news/business/companies/bhp_billiton_ltd/), accessed January 10, 2008.
- Nowotny, Helga, Peter Scott, and Michael Gibbons  
2001 *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity.
- Ok Tedi Mining Ltd. (OTML)  
2005 CMCA Environmental Predictions Update. Tabubil, Papua New Guinea: OTML.
- Ong, Aihwa  
1999 *Flexible Citizenship: The Cultural Logics of Transnationality*. Durham, NC: Duke University Press.
- Orlove, Benjamin  
1980 *Ecological Anthropology*. *Annual Review of Anthropology* 9:235–273.
- PNG Sustainable Development Program Ltd.  
2008 The Directors. Electronic document, <http://www.pngsdp.com/people/the.directors.php>, accessed June 9, 2008.
- Parametrix, Inc., and URS Greiner Woodward Clyde  
1999 Assessment of Human Health and Ecological Risks for Proposed Mine Waste Mitigation Options at the Ok Tedi Mine, Papua New Guinea. Detailed Level Risk Assessment prepared for Ok Tedi Mining Ltd. Electronic document, <http://www.oktedi.com>, accessed August 15, 1999.
- Post Courier  
2007 Mining Gains Pose Woes. *The Post Courier of Papua New Guinea*, November 28. Electronic document, <http://www.postcourier.com.pg/20071128/focus.htm>, accessed November 28, 2007.
- Pottage, Alain  
2001 Persons and Things: An Ethnographic Analogy. *Economy and Society* 30(1):112–138.  
2004 The Fabrication of Persons and Things. In *Law, Anthropology, and the Constitution of the Social: Making Persons and Things*. Alain Pottage and Martha Mundy, eds. Pp. 1–39. New York: Cambridge University Press.
- Rappaport, Roy A.  
1968 *Pigs for the Ancestors*. New Haven, CT: Yale University Press.  
1971 The Flow of Energy in an Agricultural Society. *Scientific American* 225(3):117–132.  
1993 Distinguished Lecture in General Anthropology: The Anthropology of Trouble. *American Anthropologist* 95(2):247–317.  
1996 Risk and the Human Environment. *Annals of the American Academy of Political and Social Science* 545(1):64–74.
- Ross, Michael  
1999 The Political Economy of the Resource Curse. *World Politics* 51(2):297–322.
- Sahlins, Marshall  
1993 Cere Cere Fuckabede. *American Ethnologist* 20(4):848–867.
- Sawyer, Suzana  
2004 *Crude Chronicles: Indians, Multinational Oil, and Neoliberalism in Ecuador*. Durham, NC: Duke University Press.
- Smith, Daniel  
2005 Political Science. *New York Times Magazine*, September 4: 37–41.
- Strathern, Andrew J.  
1972 *One Father, One Blood: Descent and Group Structure among the Melpa People*. Canberra: The Australian National University Press.
- Strathern, Andrew J., and Pamela Stewart, eds.  
2004 *Anthropology and Consultancy: Issues and Debates*. Oxford: Berghahn.
- Strathern, Marilyn  
1980 No Nature, No Culture: The Hagen Case. In *Nature, Culture and Gender*. Carol P. McCormack and Marilyn Strathern, eds. Pp. 174–222. Cambridge: Cambridge University Press.  
1988 *The Gender of the Gift: Problems with Women and Problems with Society in Melanesia*. Berkeley: University of California Press.  
1999 Property, Substance and Effect: Anthropological Essays on Persons and Things. London: Athlone.  
2000 Afterward: Accountability ... and Ethnography. In *Audit Cultures: Anthropological Studies in Accountability, Ethics and the Academy*. Marilyn Strathern, ed. Pp. 279–304. New York: Routledge.  
2004 *Commons and Borderlands: Working Papers on Interdisciplinarity, Accountability and the Flow of Knowledge*. Oxon, UK: Sean Kingston.
- Sunder Rajan, Kaushik  
2006 *Biocapital: The Constitution of Postgenomic Life*. Durham, NC: Duke University Press.

- Thomas, Nicholas  
 1992 The Inversion of Tradition. *American Ethnologist* 19(2): 213–232.
- Vayda, Andrew P., and Bradley B. Walters  
 1999 Against Political Ecology. *Human Ecology* 27(1):167–179.
- Wagner, Roy  
 1977 Scientific and Indigenous Papuan Conceptualizations of the Innate: A Semiotic Critique of the Ecological Perspective. *In Subsistence and Survival: Rural Ecology in the Pacific*. Tim P. Bayliss-Smith and Richard G. Feachem, eds. Pp. 385–410. New York: Academic.
- 1981 *The Invention of Culture*. Chicago: University of Chicago Press.
- 1991 The Fractal Person. *In Big Men and Great Men: Personifications of Power in Melanesia*. Maurice Godelier and Marilyn Strathern, eds. Pp. 159–173. Cambridge: University of Cambridge Press.
- Wardlow, Holly  
 2006 *Wayward Women: Sexuality and Agency in a New Guinea Society*. Berkeley: University of California Press.
- Watts, Michael  
 2000 Political Ecology. *In A Companion to Economic Geography*. Eric Sheppard and Trevor J. Barnes, eds. Pp. 257–274. London: Blackwell.
- Weiner, Annette B.  
 1980 Reproduction: A Replacement for Reciprocity. *American Ethnologist* 7(1):71–85.
- Weiner, James F.  
 2001 *The Incorporated Ground: The Contemporary Work of Distribution in the Kutubu Oil Project Area*. Canberra: The Australian National University, Resource Management in Asia-Pacific Project (Working Paper 17). Electronic document, [http://rspas.anu.edu.au/papers/melanesia/working\\_papers/workingpaperjamesweiner.pdf](http://rspas.anu.edu.au/papers/melanesia/working_papers/workingpaperjamesweiner.pdf), accessed March 15, 2002.
- Weiner, James F., and Alan Rumsey, eds.  
 2004 *Mining and Indigenous Lifeworlds in Australia and Papua New Guinea*. Oxon, UK: Sean Kingston.
- Welsch, Robert L.  
 1994 Pig Feasts and Expanding Networks of Cultural Influence in the Upper Fly–Digul Plain. *In Migrations and Transformations: Regional Perspectives on New Guinea*. Andrew J. Strathern and Gabriele Stürzenhofecker, eds. Pp. 85–119. Pittsburgh: University of Pittsburgh Press.
- West, Paige  
 2006 *Conservation Is Our Government Now: The Politics of Ecology in Papua New Guinea*. Durham, NC: Duke University Press.
- Wilson, Edward O.  
 1992 *The Diversity of Life*. Cambridge, MA: Harvard University Press.
- Wu, John C.  
 2006 *The Mineral Industry of Papua New Guinea*. 2006 Minerals Yearbook. U.S. Geological Survey. Electronic document, <http://minerals.usgs.gov/minerals/pubs/country/2006/myb3-2006-pp.pdf>, accessed January 28, 2008.
- York, Richard, and Eugene A. Rosa  
 2003 Key Challenges to Ecological Modernization Theory. *Organization and Environment* 16(3):273–288.