Citation: Kirsch, Stuart, "Indigenous Response to Environmental Impact along the Ok Tedi," Compensation for Resource Development in Papua New Guinea, edited by Susan Toft, Law Reform Commission of Papua New Guinea and Resource Management in Asia and the Pacific Research School of Pacific and Asian Studies and National Centre for Development Studies, 1997, pp. 143-155

COMPENSATION FOR RESOURCE DEVELOPMENT IN PAPUA NEW GUINEA

Edited by Susan Toft

Published jointly by

Law Reform Commission of Papua New Guinea
(Monograph No 6)

and

Resource Management in Asia and the Pacific
Research School of Pacific and Asian Studies
The Australian National University, Canberra

and

National Centre for Development Studies
The Australian National University, Canberra
(Pacific Policy Paper 24)

The contribution of the Australian Agency for International Development (AusAID) toward the publication of this series is gratefully acknowledged.

ISSN 0817-0444

National Library of Australia Cataloguing-in-Publication entry

Compensation for resource development in Papua New Guinea

Bibliography.
ISBN 0 7315 2353 9.

1. Compensation (Law) - Papua New Guinea. 2. Liability for environmental damages - Papua New Guinea. 3. Mineral industries - Environmental aspects - Papua New Guinea. 4. Mineral industries - Social aspects - Papua New Guinea. I. Toft, Susan. II. Australian National University. National Centre for Development Studies. III. Law Reform Commission of Papua New Guinea. (Series: Pacific policy papers ; 24). (Series: Monograph (Law Reform Commission of Papua New Guinea ; no. 6).

344.953046

Cover by Peter Ela, Faculty of Creative Arts Production Workshop
University of Papua New Guinea
and
LujanSheen Design
Pagemaker: May Stinear
Printed in Australia by Paragon Printers

CHAPTER NINE

INDIGENOUS RESPONSE TO ENVIRONMENTAL IMPACT ALONG THE OK TEDI[1]

Stuart Kirsch

> We declare our fourth goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and to be replenished for the benefit of future generations.
> *The Fourth Goal and Directive Principle of the Papua New Guinea Constitution* (Papua New Guinea 1975).

Unrealistic landowner demands for compensation are often cited as a significant cause of Law and Order problems in Papua New Guinea. Resource development projects like mining and logging have increasingly become the subject of heated debates that threaten or lead to civil disorder. These conflicts are usually explained in economic terms, focusing on landowner dissatisfaction with their share of the benefits from the project in question. Landowner claims for compensation are widely regarded as 'out of control', creating an unstable climate for international investment in resource development projects.

There are two major problems with economic explanations of conflict between landowners and resource developers. First, purely economic explanations favour resource developers and place landowners at a disadvantage. Second, economic explanations obscure alternative points of view. From an economic perspective, all conflict between landowners and resource developers may be reduced to disputes about compensation. In the case of environmental impact, for example, it is assumed that it is possible to provide adequate compensation to landowners for damage to their natural environment and resources, regardless of the severity of the impact and the resulting disruption of their lives. This allows developers to continue business as usual in the face of landowner complaints about environmental impact, which are redefined as demands for increased compensation. Yet, ignoring landowner concerns about

environmental impact inevitably leads to conflict. Framing the problem in economic terms also allows developers to limit their liability to material claims, avoiding questions about moral responsibility to the people whose lives they have adversely affected. Finally, economic rhetoric about unreasonable landowner expectations actually benefits developers by devaluing landowner claims. This point was underscored by a story told to participants at a recent conference on investment in the Papua New Guinea mining and petroleum industries: if Jesus lived in Papua New Guinea today, the story went, and Judas were to betray him for thirty pieces of silver, it would be nearly impossible to find a landowner who would blame him for taking the money.[2] The crowd roared with laughter, embracing the stereotype of the greedy and immoral landowner.

In this chapter, I propose alternative ways of understanding conflicts that can emerge when landowners seek to limit the amount of damage done to their natural environment and resources by development projects. I illustrate my argument by delineating the response of the people living downstream from the Ok Tedi Mine to its impact on their environment. I use ethnographic examples to show how landowners frame their conflict with the mine in moral rather than economic terms. From their perspective, the mine has refused to take responsibility for its actions, and I discuss how landowners seek to hold the mine accountable for its effect on their lives. I also examine how the people living downstream from the mine interpret the resulting changes to their natural environment. The dramatic transformation of their landscape has resulted in fear of environmental 'collapse'. Significantly, the people of Bougainville have described the effects of the Panguna copper mine on their island in much the same way, and I briefly compare the two cases. In presenting this material, my goal is to demonstrate that the issue of environmental protection, and in particular, the environmental rights of people affected by development, must be given appropriate consideration in national debates on compensation.

Response to environmental degradation along the Ok Tedi

The Ok Tedi Mine is a massive open cut copper and gold mine located in the Star Mountains of western Papua New Guinea (Jackson 1982, Pintz 1984, Hyndman 1994). The mine releases all tailings and other waste materials that it produces directly into the Ok Tedi River, causing widespread deforestation, extensive fish kills, disruption of local food production, and a host of other problems. The Ok Tedi is a tributary of the Fly River, and the mine has adversely affected the environment downstream along the Fly as well, albeit to a lesser extent.

In this chapter, I focus primarily on the response of the Yonggom people to the mine. Approximately 3,500 Yonggom live in Papua New Guinea, mainly along the Ok Tedi River, where the effects of the mine on the river system are most pronounced (Kirsch 1989). Other Yonggom villages are located along the Fly River, north of the point at which the river forms the border with Irian Jaya, Indonesia. I have carried out ethnographic research among the Yonggom since 1986, including two years residence in a village on the Ok Tedi River (Kirsch 1991), and three return visits, most recently in 1994.

More than 15,000 Yonggom speakers live west of the border in Irian Jaya, Indonesia, where they are also known as the Muyu (Schoorl 1993). In 1984, 5,000 Yonggom refugees from Irian Jaya settled in Papua New Guinea in protest against Indonesian rule (Kirsch 1989). Most of the refugees continue to live in camps close to the border, where they compete for resources with the Yonggom villagers from Papua New Guinea.

The Yonggom combine traditional subsistence strategies with participation in the regional cash economy. The area in which they live is dominated by lowland rain forest cross-cut by narrow, swampy valleys. Their staple food is the starchy flour extracted from sago palms (*Metroxylon sagu*). They grow bananas in swidden gardens, along with small quantities of pitpit, sugarcane, greens, and introduced vegetables such as pumpkin and cucumber. Hunting, fishing, and gathering from the forests and rivers contribute an important portion of their diet as well. Villagers earn cash by tapping rubber trees, and by selling forest and garden produce in urban markets. In town, Yonggom men and women work in local stores and businesses, at the Ok Tedi Mine in Tabubil and the harbor in Kiunga, and in the public service (King 1983). Circular migration between the village and town is nearly universal; however, most adults still prefer to live in a rural setting, where until recently they had greater control of subsistence resources, and to which they maintain strong emotional and ideological ties.

Life downstream from the mine

In 1992, while I conducted research for a social impact study evaluating the effect of the Ok Tedi Mine on the Yonggom (Kirsch 1993), the people in the villages told me that they could easily 'see with their own eyes' that the 'river had gone bad'. I observed that in the three years that had elapsed since my previous visit, much of the rain forest fringing the Ok Tedi River had died along a corridor nearly 40 kilometres in length. Similar deforestation had occurred along the numerous creeks and streams that feed into the Ok Tedi.

Riverine gardens that once were fertilised by alluvial soil washed down from the mountains now lay submerged under several metres of sediment and other mine waste, increasing pressure on less productive garden land in the rain forest interior. According to the Yonggom, the few fish left in the rivers had 'no fat' and 'no blood,' they 'smelled bad,' and the people were afraid to eat them. The white sandbanks along the Ok Tedi River, where turtles once laid their eggs, had been covered by tailings and sediment released by the mine. In contrast with the past, few birds flew along the Ok Tedi River.

By 1992, it had become increasingly difficult for the Yonggom living along the Ok Tedi River to produce enough food using traditional subsistence techniques. In many of the villages, people told me that the sago palms growing along the river and affected waterways no longer produced the usual starch bearing pith. In order to increase their dwindling food supply, people living by the river had begun to experiment with a new kind of garden, using introduced root crops and cultivation techniques borrowed from elsewhere in the country (Kirsch 1993:27). This was the first time that I heard the Yonggom complain about food shortages, hunger, increased illness and malnutrition.

Holding the mine accountable

One group of Yonggom villagers asked me why international law did not prevent the mine from polluting their environment. They wondered why crocodiles and other riverine animals were not protected from the mine. They claimed that the government and the Ok Tedi Mine are *inamen ipban*, which means 'lacking sense'. People the Yonggom describe as *inamen ipban*, including sorcerers and those suffering from mental illness, are considered incapable of socially responsible behaviour. One man told me that if he were to die, the Ok Tedi Mine would be to blame. He used the expression *yi dabap kandanip*, meaning 'they will take the weight', an expression used to charge someone with complicity in an act of sorcery. Another man stated that since the mine began production, the people along the river have been forced to 'live in fear' (*une doberime*) because of the hazardous nature of the chemicals and other waste materials released by the mine into their river system. 'Live in fear!' is what people used to shout to their neighbours after a sorcery killing.

As these examples suggest, the Yonggom compare the mine and its impact on their environment to sorcery and its harmful effects. In Yonggom society, illness and death are usually explained as the consequences of sorcery (Kirsch 1991). Sorcery is a form of negative reciprocity in which social relationships are abrogated (Munn 1986:232–3). Sorcerers violate the basic principles of

Yonggom society in acts that bring harm to others. To the Yonggom, the mine is irrational and dangerous, like a sorcerer.

The Yonggom also take this analogy between sorcery and the impact of the mine one step further. Illness, injury and accidents that in the past would have been attributed to sorcery, are now explained in terms of the destructive impact of the mine on their environment. The following three cases illustrate this process of explanation.

Case 1

The loss of a finger

One day in June of 1992, Awi Dowon took his canoe and went fishing at Ok Kobom, a heavily silted creek along the Ok Tedi River. He caught a catfish, but cut his finger on its sharp whiskers. On his way home, his hands were exposed to water from the Ok Tedi. Dowon later concluded that the river water, which contained copper *marasin* (copper chemicals) from the Ok Tedi Mine, caused his finger to become infected.

The finger became swollen and very painful. Several weeks of treatment in the village were unsuccessful, leading Dowon to seek assistance at the regional hospital in Rumginae. There the doctor promptly scheduled surgery to amputate the finger. According to the attending physician, the toxin from the catfish spine caused necrosis in the lower tendons of the finger; this was an unusual occurrence, but not without precedent. Awi Dowon, however, said that he had been poisoned by the mine.

Case 2

A broken leg

The same year, Ketop Negat from Yeran village went to Ok Kobom creek to fish. He chopped up a dead sago palm, looking for beetle larvae to use as bait. He decided to cut down a mature sago palm and return later to shoot any wild pigs that might come to feed on its starch.

When rainfall in the mountains to the north is heavy, the Ok Tedi River swells greatly, forcing water back into its tributaries. When the rains subside, the mine wastes and sediment carried by the Ok Tedi are deposited along the banks of these streams as the water levels in the Ok Tedi recede. Over time, these deposits have accumulated to the depth of a metre or more. The resulting mud banks are difficult to traverse.

Negat was standing knee deep in one of these deposits when the tree he was cutting down unexpectedly started to fall towards him. He tried to move away, but was not fast enough. The tree fell and struck him below the waist,

breaking his leg. According to Negat's wife, the mud in which Negat was standing prevented him from moving out of harm's way. She therefore holds the mine responsible for her husband's broken leg.

Case 3

An overturned canoe and a drowning

Late one afternoon in 1987, a motor canoe travelling from the town of Kiunga on the Fly River to a village on the Ok Tedi River overturned in the strong currents at the junction of the two rivers. Three people drowned. Several months later, I attended a community meeting in Kiunga regarding compensation payments for the deaths. One of the men who died had two sons with reputations for fighting and causing trouble. At the meeting, it was alleged that the young men might bear partial responsibility for the deaths, because someone may have sought revenge against them by causing the accident that killed their father. The accusation effectively quieted the family, who consented to accept the canoe owner's offer of compensation.

Yonggom discussions about the responsibility for sorcery killings rarely produce a consensus (Kirsch 1991). Instead, the results of these debates are generally ambiguous and open-ended, which tends to forestall violent acts of reprisal against persons suspected of sorcery. Opinions are revised as new information becomes available. In this case, while the behaviour of the sons was considered to be a possible motive for the act of sorcery that caused the canoe accident, there was no final assignation of liability.

When I returned to Papua New Guinea several years later, the case of the overturned canoe had been reopened. In discussions with people living in Kiunga, I was told that the canoe owner planned to seek compensation from the Ok Tedi Mine for the death of the passengers travelling in his canoe. The sediment released by the mine into the river system has led to the aggradation of the river bed, which makes the river shallower and causes it to flow faster. The result is that the Ok Tedi River has become increasingly dangerous to navigate, particularly after heavy rainfall in the mountains. The junction of the Ok Tedi and Fly Rivers is consequently especially hazardous; this is how the Yonggom now explain the canoe accident (Maun 1994:97).

Claims against the mine

What do the three examples have in common? In each case, the proximate cause of the mishap—the wound from the sharp catfish whisker, the collapse of a tree in an unexpected direction, and the strong currents at a river junction—is recognised by those involved. It is not difficult to explain what has happened.

Following the basic paradigm for sorcery, however, in which people are the cause of misfortune, rather than chance or natural forces alone, the challenge is to assign social responsibility. At this point, explanations based on the events themselves become subordinate to moral claims.

Sorcery accusations are used to hold people accountable for their actions; they are a form of social control. A sorcery accusation brings two things together like cause and effect: a person who has been behaving inappropriately, and some kind of loss or mishap. Similarly, claims against the Ok Tedi Mine pair its destructive environmental impact with specific cases of misfortune. They represent moral assertions about how the mine has affected their lives, and they seek to hold the mine accountable.

Mining and pollution

Even though the consequences of mining and sorcery are in many ways alike, the Yonggom do not confuse the two. This fact is clearly borne out in the language that they use to describe the effects of the mine on their river system.[3] The Yonggom adverb most commonly used to describe the condition of the river is *moraron*, which means spoiled, rotten, or corroded, such as food that has gone bad, or wood that has decayed. The tailings and other waste materials released by the mine into the river system are called *muramura* in Hiri Motu or *marasin* in Tok Pisin; both words refer to medicine as well as chemicals in general. The expression 'copper *marasin*' is commonly used to refer to the harmful, although not necessarily visible, effects of chemicals used by the mine (Burton 1993b:2). Finally, the English 'chemical' and 'poison' may be used in the standard way, as well as 'pollution' and 'environment', neither of which were part of the village vernacular until quite recently.

People do not refer to the impact of the mine using the specialised vocabulary of sorcery: *bom* and *mirim* packet sorcery, or *kumka* and *kuman* assault sorcery. In other words, although the mine causes harm to people like sorcery does, the two operate in very different ways. None of the descriptions of the ill effects of the mine have any mystical or metaphysical implications; they refer directly to physical and chemical processes (Burton 1993b:3). Thus, while the Yonggom compare the effects of sorcery and mining, they clearly differentiate between the two. The last case study also illustrates this point.

Case 4

Death by assault sorcery

Wurin Maun from Yeran village walked for several hours through the rain forest, looking for prawns to catch. Alone in the forest, he was attacked and

killed by an assault sorcerer, whom the Yonggom call a *kuman*. His body was not found for several days. None of this, according to his nephew, would have happened were it not for the effect of the Ok Tedi Mine on local resources, which forced Maun to walk further than usual from his village for food, leaving him vulnerable to attack.

In this case, even though sorcery was considered to be the proximate cause of the death, the mine is still held responsible for the circumstances that led to the assault. Again, while sorcery and mining may have similar consequences, the Yonggom see them as two different phenomena.

Environmental impact and moral accountability

The Yonggom draw on this analogy between sorcery and mining in order to formulate claims about the mine's environmental impact. Anthropologists have described the belief in sorcery as a philosophy of 'social accountability' (Douglas 1980:46–60) in which misfortune is explained in terms of human action (Evans-Pritchard 1937:18–19). The Yonggom apply this moral philosophy in their effort to compel the mine to take responsibility for its effect on their lives. In doing so, they extend their claims beyond the realm of damage to the physical environment. They reject the view that the mine's liability is limited to material terms. Instead they recast discourse about the mine as a moral issue.

Environmental collapse

The Yonggom consider the Ok Tedi Mine responsible for the collapse of their environment: from the river system, to their gardens, to the surrounding forests. This view is perhaps best summed up by their use of the term *moraron* to describe the despoiled condition of their physical landscape. Even the Yonggom villages located in the raised foothills several kilometres west of the affected river system report traumatic environmental impact. In these villages, the detrimental effects of the mine are said to spread through the creeks and streams, to come up through the ground, or to fall to the earth in the rain. That this poison cannot be seen in no way impedes its destructiveness, as the people from Kungim describe in a 1992 letter to the Ok Tedi Mine (reproduced here verbatim):

> ...they seem's to be some prove of garden crops dogs and pigs, fish human beings being sick almost every now and then. Coconuts in the villagers getting dry. Even our stable food [sago] has some prove of all this. Rain makes us sick. Air we breath makes us short-wind. Sun makes us get sun burn.
>
> Before in 1992 and the year below these everything was perfect. All these complain's mentioned have never experiences. When the OTML Company moved in, in 1982

> up until now 1992, all this crops mentioned above and some more were completely have changed and got spoiled and we are concerned and it seems to be asked that these are the signs affected by the Ok Tedi Mining Limited...Our life style have changed completely (reproduced in Kirsch 1993:75–6).

The mine is regarded as the primary cause of environmental damage that is widespread and systematic, rather than restricted to limited areas or specific plants and animals. The Yonggom fear that the natural environment has been affected at its most fundamental level, so that even the air, the rain, and the sun are now harmful. They believe that the pollution from the mine has brought about the collapse of their environment.

A significant parallel can be found in the Bougainville case. In a 1988 letter signed by Francis Ona, who later led the landowner rebellion in Bougainville, the Panguna Landowners Association requested that the national government commission an independent scientific investigation of the environmental impact of the Panguna Copper Mine. The problems described in the letter included: soil that may have been poisoned by toxic chemicals; diseases plaguing their plant crops; shortened life spans of other garden plants; an unknown pollutant affecting cocoa harvests; introduced plant species colonising areas previously occupied by local flora; deforestation near mine facilities; decline in numbers of game animals; landslides; chemicals in the river system; large numbers of people suffering from illness; air pollution; and the unexplained disappearance of flying foxes from the island (reproduced in Applied Geology Associates 1989: Appendix VI).

The members of the landowners association agreed to abide by the findings of an independent scientific inquiry, but when the preliminary results of the investigation conducted by Applied Geology Associates were made public in 1989, they became infuriated. At a meeting to discuss the report, representatives of the investigating team stated that

> ...although mining operations had resulted in extensive damage to the physical environment, they had found no significantly high levels of chemical pollution. They described as unlikely the opinion held by many Bougainvillians that BCL [Bougainville Copper Limited] was responsible for the decrease in wildlife and the decline in soil fertility (except of course in the pit and waste-dump areas), or for certain illnesses then prevalent in the lease-area villages (Oliver 1991:208).

The findings of the study differed substantially from what landowners believed to be true, based on their own experience (Papua New Guinea 1991:53). Calling the survey a 'white-wash', Francis Ona stormed out of the meeting (Oliver 1991:208). Connell (1991:71) suggests that this incident may have been the 'catalyst for the transition to violence and the eventual closing of the mine'.

Colliding ecologies

When two very different systems for exploiting natural resources meet in overlapping geographic territory, we can talk about the resulting 'colliding ecologies'. When two ecological systems collide, the more powerful may impose itself on the other, transforming the natural environment in ways that limit the effectiveness of the other system. This process may give rise to perceptions of environmental collapse.

Resource development projects like the Ok Tedi Mine are global in scope, dominated by distant capital, and responsive primarily to the demands of the world market. In the case of the Ok Tedi Mine, economies of scale dictate the massive size of the project. Mining is an intensive process, focused on a single type of resource, which it eventually exhausts. Without appropriate facilities for the containment of the tailings and other waste material that it produces, the Ok Tedi Mine not only affects the area in which the ore deposits are located, but exports destruction downstream as well. Harsh treatment of land that has been set aside for production may be common in industrialised economies, but the resulting landscape is quite alien to the Yonggom.

In contrast, Yonggom subsistence and production strategies are largely local and regional in scope. They are extensive, drawing on a wide array of resources. Most of their modifications to the landscape increase the value of their resources, e.g. in planting useful tree species, rather than depleting them. With the collision of these two ecological systems, the Yonggom find that their traditional subsistence strategies are no longer sufficient for survival. They are also forced to confront an industrial landscape in their own front yard, as were the people affected by the copper mine in Bougainville.

Nash evaluates the impact of colliding ecologies on the people of Bougainville:

> The destruction of the landscape has enormous power—it is a cataclysmic event—in a subsistence society like Bougainville. For most Bougainvilleans there is no frontier, no prospects for escape, no endless scenes of other places electronically delivered to give them a fantasy sense of place, as television does with us. Their land is not only for material benefit, which compensation payments reduce it to; it encodes their history and identity and is a major source of security(Nash 1993:17–18).

The loss experienced by the Bougainvilleans is more tangible because of their complete dependence on their land, more unrelenting because there are no alternative landscapes for them to contemplate, and more disruptive because their identity and history are physically grounded by their land.

The people living downstream from the Ok Tedi mine, like the inhabitants of Bougainville, are the victims of colliding ecologies. The mine has

transformed their landscape almost beyond recognition. Much of what they once took for granted about their natural environment no longer holds true. Is it any surprise that they have come to regard even the rain, the air, and the sun with great suspicion?

Signs of the environmental crisis

Neither scientific nor economic approaches to environmental change are entirely compatible with the Yonggom perspective. In scientific terms, environmental impact can be evaluated by measuring changes in plant and animal populations. In economic terms, it is the loss of resources with value as commodities, that is, things which can be bought and sold, that are measured. However, the observation that few birds fly along the Ok Tedi, or that there are no more flying foxes on Bougainville, is more than a reference to change in species composition or economic loss. In each case, the missing animals also symbolise broader patterns of environmental change.

Conservation biologists use the concept of the 'flagship species' to describe prominent or valuable species, the well-being of which is dependent upon, and representative of, an entire ecosystem. The birds of the Ok Tedi River and the flying foxes of Bougainville are examples of flagship species. While social and cultural factors influence the choice of a flagship species, their status is a good indicator of the health of the ecosystem as a whole.

Public outcry over the disappearance of a flagship species indicates a general state of alarm about environmental conditions. It does not matter whether scientists can trace its decline directly to the mine; narrow scientific investigation of harm to a flagship species misses the mark. The loss of symbolically important species metonymically represents the broader environmental crisis.

Yonggom resistance

Yonggom resistance to the mine is being carried out in an increasingly wide array of contexts; it ranges from demands for compensation levied directly against the mine, to political efforts at the provincial level to enforce stricter environmental standards, to lawsuits in the national court system. Rumors circulate about an underground political movement known as the Fly Revolutionary Army, named after the organisation responsible for the uprising in Bougainville, although to date landowners have avoided the kind of explosive violence that turned the island of Bougainville into a war zone.

The Yonggom have also enlisted allies in the international conservation community, in part through participation in several prominent environmental

forums in Europe and the Americas. Yonggom activists Rex Dagi and Alex Maun testified before the International Water Tribunal in The Hague in conjunction with a case brought against the Ok Tedi Mine. They travelled to Germany to meet with the press following the 1991 release of the Starnberg report, which criticised the environmental record of the Ok Tedi Mine. The resulting press conference led the German Federal Parliament to pass a resolution directing German shareholders in the Ok Tedi Mine to seek stricter environmental controls (Schoell 1994:13–14). Dagi also met with leaders of several conservation groups in the United States and was a delegate to the 1992 Earth Summit in Rio de Janeiro, where he participated in a press conference aboard the Greenpeace ship '*Rainbow Warrior II*'. Dagi and Maun have successfully orchestrated a campaign to bring international pressure to bear on the Ok Tedi Mine.

Along with their colleague Gabia Gagarimabu from Kiwai Island, the two Yonggom activists also sought relief through the legal system. With the assistance of Slater & Gordon, an Australian law firm, the affected land-owners filed a multi-billion dollar lawsuit against the Australian resource giant The Broken Hill Proprietary Company Limited (BHP), the majority shareholder and operating partner of the Ok Tedi Mine. The suit, filed in the Victorian Supreme Court in Melbourne, the legal domicile of BHP, sought compensation for damages and a judgement that would require the mine to greatly reduce the volume of tailings and other waste material that it releases into the river system. The lawsuit represents approximately 30,000 people living along the affected rivers.

The decision of the landowners to pursue their claims in court, rather than resorting to potentially violent alternatives, should be applauded. The law may give them the leverage that they need in order to bring about environmental reform. Unless the environmental impact of the Ok Tedi Mine is brought under control in the near future, however, there is no guarantee that the protests against the mine will remain peaceful, as levels of frustration regarding the destruction of their environment continue to increase.

Discussion and recommendations

Several general recommendations follow from the preceding analysis. Existing institutions and forums which facilitate communication between landowners and resource developers should be strengthened. Landowners should be partners in decision-making about appropriate levels of environmental protection, strategies to mitigate damage that does occur, and changes to production

processes that are environmentally unsound. Landowners should also participate in negotiations that establish equitable levels of compensation when there is environmental impact from resource development projects.

A regular programme of independent environmental impact assessment is a necessary component of all development projects, but such studies should take cultural differences in attitudes towards the environment into account, as well as scientific evidence of physical impact on the environment. The failure to understand and respond to landowner concerns about environmental impact is a certain recipe for conflict.

In legal terms, the environmental provisions of the Papua New Guinea Constitution, which protect the rights of citizens to make productive use of their land and resources, should be more rigorously enforced. Politically and economically, it is necessary to address systemic imbalances which currently favour the plans of large developers over the rights of local landowners. The moral dimensions of large scale development projects, given the extent to which they affect people's lives, should be given greater consideration as well. Finally, the protection of landowner rights and the pursuit of environmental justice should be considered essential components of all resource development projects in Papua New Guinea, and fundamental concerns of the country's legal system.

Notes

1 Research for this project was sponsored by Unisearch PNG Pty Ltd in July and August 1992, under contract to Ok Tedi Mining Ltd. Portions of this material previously appeared in the resulting social impact study (Kirsch 1993). I gratefully acknowledge the cooperation of the people living in the Yonggom communities that I visited, and in particular, the assistance of Atani Wungmo and Buka Nandun. Subsequent visits to Kiunga in 1993 and 1994 were funded by Mount Holyoke College. I also thank David Akin, John Burton, Lynn Morgan, Janet Richards, Buck Schieffelin and Michael Speirs for their comments on previous drafts of this chapter. I assume full responsibility for the material presented here.

2 The conference on Mining and Petroleum Investment in Papua New Guinea, sponsored by the Papua New Guinea Chamber of Mines and Petroleum, was held at the Regent Hotel in Sydney, Australia on 20–21 March, 1995.

3 The region inhabited by the Yonggom is at the confluence of three trade languages: Police Motu, Bahasa Indonesia, and Tok Pisin. English is also increasingly spoken and understood. Loan words from all four languages are commonly used in everyday speech.