PNG's Ok Tedi, Development and Environment

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The Ok Tedi mine commenced operations on 15 May 1984, bringing tremendous change to the Western Province of Papua New Guinea (PNG). On a national level, PNG depends on the mine for 15.6 per cent of export income, royalty and taxation payments. Regional development of the Western Province of PNG has been facilitated by the Ok Tedi mine and the development of the mine has accrued substantial benefits to the local people. The mine has created employment and business opportunities along with education options. Through the provision of medical services, people in the mine area have experienced decreased infant mortality, a decreased incidence of malaria and an average 20 year increase in life expectancy.

Some 58 million tonnes of rock are moved each year at Ok Tedi by means of open cut mining techniques. Of this, 29.2 million tonnes of ore are recovered per annum while the remainder is overburden or associated waste. The result of this production is about 589 000 tonnes of mineral concentrate, which is exported to markets in Asia and Europe. The metal contained in the concentrate for 1993 was 203 184 tonnes of copper, 11 tonnes of gold (394 039 ounces) and 26 tonnes of silver (904 688 ounces). Initially the gold rich oxidised cap of the ore body was mined at a more modest rate, until the commencement of copper sulphide mining in 1988.

Whilst numerous benefits are recognised, the mine has not been without problems, both environmental and financial. A tailings dam, constructed at a cost of over $70 million, collapsed in 1984 immediately prior to the commencement of gold mining. The lack of a tailings dam has meant that tailings and overburden are discharged directly into the Ok Tedi River. At the current rate of mining this is around 58 million tonnes per annum. From the Ok Tedi, the waste enters the 1 000 km Fly River system. A recent feasibility study has estimated the cost of a new tailings dam at between $573 and $1 333 million. This sum may be compared to the total mine development cost of $1 970 million or the mine’s annual gross export earning of over $500 million.

The effects of mining on the Ok Tedi River are dramatic. For some 100 km downstream of the mine the river is in effect a slurry, with some 18 million tonnes per annum deposited annually in this area. Further downstream, dilution with the Fly and Strickland Rivers reduces the impact, but local people are concerned about their subsistence livelihood which relies on fishing. Concern about the possible impact of residual copper on the ecology of
the Gulf of Papua, the Torres Strait Islands, and the northern extremity of the Great Barrier Reef has been raised, but an Australian Government sponsored study indicates there is no contamination.

The villagers downstream of the mine filed liability claims in May 1994 both in PNG and Australia over the river pollution affecting their livelihood. Seventy-one land holders representing around 30,000 villagers are involved in the claim for $4 billion. The Australian law firm representing the villagers is Melbourne based Slater and Gordon. Australia’s involvement in the mine is through the site manager and main owner of Ok Tedi Mining Ltd (OTML), Broken Hill Proprietary (BHP). The PNG Government and BHP have negotiated a settlement which provides $110 million (K110 million) in compensation for the villagers.
Background to Ok Tedi

The Ok Tedi open cut copper mine is located in the southernmost parts of the precipitous, rainforest cloaked Star Mountains of PNG. The border with the Indonesian province of Irian Jaya is only 18 km to the west of the mine, as shown in Figure 1. Tabubil is the nearest regional centre and now provides the headquarters for the Ok Tedi mining operation. The population of Tabubil is around 10,000, making it the largest settlement in the Western Province of PNG. The mine is on the 2,094m high Mount Fubilan and the Folomian processing plant is 1.6 km to the east at an elevation of 1630m. Folomian is 20 km north west of Tabubil. Supplies for the Ok Tedi mine and associated infrastructure are shipped through the Fly River port of Kiunga, connected to Tabubil by 137 km of road.

Rainfall is around 8,000 mm per annum at Tabubil and in excess of 9,000 mm at the mine site, which compares to 630 mm in Canberra. The mine site experiences only 25 rain free days each year. Engineering and environmental challenges are complicated by the fractured nature of the rock in the area and the pronounced, but infrequent, seismic activity. Major landslide events in the region are of immense scale and frequent occurrence, often washing millions of tonnes of sediments down the local rivers. Landslide events result in raised river beds, vegetation scouring and deposition of sediment above the river banks.

Local road systems exist only as a result of mine development as indicated in Figures 1 and 3, while river transport provides most access. Elevation and rainfall rapidly drop away from the Star Mountains; at the convergence of the Ok Tedi and Fly rivers the plain is only 20 metres above sea level. At Kiunga, the Fly River port, the rainfall is only 4,600 mm per annum.

The close proximity of the Ok Tedi mine to the Irian Jaya border, only 18 km, has necessitated bilateral agreements and a broadening of the relationship between PNG and Indonesia. The Fly River, downstream of the mine, forms a common border between the two countries and is essential for the transport of Ok Tedi supplies and products. The two governments signed a bilateral treaty in 1980 on the joint use of the Fly River that specifically recognised Ok Tedi.
Figure 1: Ok Tedi - Locality Maps

Major River
Road
Town Centre
Mt Fubilan
Ore body
and mine
Pipeline
and road
to Kiunga
Mine tailings
have raised the
sediment load
and river bed
in this area

Indonesia

Ok Tedi Mine
Map Area

Papua
New
Guinea

Map Area:

Scale
0 50

SANDAUN PROVINCE

EAST SEPIK PROVINCE

ENG A PROVINCE

SOUTHERN HIGHLANDS
PROVINCE

GULF PROVINCE

WESTERN PROVINCE

IRIAN JAYA
INDONESIA

FLY RIVER DELTA

QUEENSLAND
AUSTRALIA

TORRES
STRAIT

UMADA ISLAND
TRANSIPMENT VESSEL

Great Barrier Reef

FlY RIVER

FLY RIVER

STRICKLAND RIVER

Lake Murray

NINERUM

Tabubil

Ok Tedi

Kitunga

Normad

Balimo

Daru

Morehead
Discovery and Development

An Australian Government patrol first made contact with the Min people of the Star Mountains region in 1963. The patrol leader noticed signs of copper mineralisation near the present mine site and collected samples for analysis. No further action occurred until 1968 when, geologists from the Kennecott Copper Corporation confirmed the existence of a mineral deposit on Mount Fubilan, a 2,094m high southern extremity of the Star Mountains. The project on Mount Fubilan was named after a local river, the Ok Tedi, where Ok is the local word for river.

Financial analysis by Kennecott indicated that the project was marginal to sub economic in 1972, but further exploration was recommended to prove up the project. Extensive exploration investment followed and was well advanced by 1975. Following protracted negotiations over the terms of mining with the Somare Government Kenneccott withdrew from the project in March 1975. PNG’s period of self government as an Australian protectorate ended with political independence from Australia in September 1975.

The Government of PNG and Australia’s BHP Corporation formed an international consortium to assess the feasibility of gold and copper mining in 1976. The feasibility study was presented to the PNG Government in 1979. Ok Tedi Mining Limited (OTML) was incorporated on February 27, 1981, to develop and operate the project. A three phase development programme costing $1.97 billion took another eight years to bring the project to fruition. Developments included; mine site infrastructure, mineral processing plants, a 56 megawatt hydro electric power station, and headquarters in the township of Tabubil. The current OTML structure is a joint venture between BHP (52 per cent), the Canadian Metal Mining Corporation (18 per cent) and the PNG Government (30 per cent). The PNG Government negotiated a 10 per cent increase to 30 per cent with BHP during 1994.

Production from the Ok Tedi mine started in 1984, but only from the copper poor, gold rich oxidised cap. Relative to the major copper sulphide zone this resource was limited, as indicated in Figure 2. Below the ground surface, water containing oxygen has percolated into the ore body, and, over time, has reacted with the copper sulphide. Copper has been mobilised and leached away, the rock structure has deteriorated and the gold mineralisation remained in the weathered ore. The processing of this type of oxidised ore is less complex than the copper sulphide mineralisation, and the gold produced can be transported to markets without the infrastructure required for copper concentrate. Consequently, the oxidised cap provided cash flow to the mine during the important early phases of operation.
Figure 2: Original Ok Tedi Orebody and Mount Fubilan.

Figure 3: Ok Tedi Locality Map.
Six months before gold production commenced the $70 million tailings dam collapsed. Tailings is the finely crushed rock from which the copper and other valuable metals have been removed. Overburden is waste rock from above the ore body, which consists of coarse rock fragments. The slopes in the area of the Ok Tedi mine are relatively moderate only about 1:3, but being geologically young and seismically active, unstable surfaces are common. During a landslide, 122 hectares of land some 30m deep moved towards the Ok Ma river, wiping out the dam. Agreement was reached with the PNG Government for an interim disposal system using a local river, but only for the gold production phase.

OTML studies found that the construction of another tailings dam was financially difficult and argued this case to the PNG Government. Permission was given for the copper mining phase to commence in 1988 using river dumping. Although mining of gold cap ceased in 1988, the impact upon the Ok Tedi river system increased dramatically as a result of the much larger scale of copper sulphide mining. Each year, about 58 million tonnes of fine tailings and coarse waste rock is discharged into the Ok Tedi. Some 40 million tonnes of this reaches the Fly River each year. Consequently, 18 million tonnes of sediment is deposited in the Ok Tedi each year. The eventual site of deposition is the Gulf of Papua, but residence times in the Fly River estuary are estimated at 15 years.

The people within the mine lease are given compensation and royalties are paid on production, but the mine waste affects the river system with decreasing impacts downstream due to dilution. For about 100 km downstream of the mine tailings and overburden have turned the river into a slurry, raising its level, causing fish to move or die and smothering vegetation. People in this zone and further downstream have been seeking recompense for some time. The villagers downstream of the mine filed liability claims in May 1994 both in PNG and Australia over the river pollution's impact on their livelihood. Seventy-one land holders representing around 30 000 villagers are involved in the claim for $4 billion. The Australian law firm representing the villagers is Melbourne based Slater and Gordon.

The PNG Government and BHP have negotiated a settlement which provides $110 million (K110 million, the current exchange rate of Australian dollar to Kina is about 1:1) in compensation for the villagers. The settlement also provides for the acquisition of another 10 per cent of OTML by the PNG Government. Concerns over the provisions in the agreement to fine anyone who initiates litigation against BHP have been aired in PNG and Australia. The settlement is likely to go before the PNG Parliament in September 1995, the *Eighth Supplemental Agreement* between the PNG Government and OTML. Legal action may continue in Australia against BHP if this legislation is enacted. The PNG Cabinet has also decided to commission an independent study into the feasibility of constructing a tailings dam at the Ok Tedi mine.²

Ok Tedi has not resulted in the anticipated 'pot of gold' for the owners. Mine development costs were 50 per cent more than originally planned at around $1.4 billion. Unanticipated
problems occurred such as a drought which meant that Fly River transportation was closed. Eventually Hercules aircraft flew in much of the construction equipment at additional cost. Relatively few profit derived company taxes have been paid to the PNG Government and BHP is not making exceptional profits from the project. For 1994 the value of Ok Tedi copper concentrate exported from PNG was over $500 million, strong copper prices are likely to improve this situation. Projections for future cash flow are optimistic and costs should remain stable, but this is an exceptional part of the world. The enormous rainfall and other geographical and cultural aspects make Ok Tedi very different to a mine in Australia.

Geology and Mining

The core of Mount Fubilan is a disseminated copper porphyry ore body, which prior to open cut mining was capped by a substantial gold deposit. The mineralisation occurred about 1.2 million years ago, during the Pleistocene period and has undergone surface weathering and erosion since that time. Figure 2 is a simplified representation of the ore body on Mount Fubilan. The gold cap was exhausted by 1988, but provided an important source of capital during the early phases of mine operation. The sulphide copper body now being mined contains economic gold and silver mineralisation. Chalcopyrite (CuFeS2) is the primary copper bearing mineral, with associated bornite (Cu9FeS8), molybdenite (MoS2) and iron sulphide (FeS2). Gold and silver in the Ok Tedi deposit are finely scattered through the porphyry and along rock fractures. These minerals are both free in the deposit and present in association or combination with the sulphides.

The current mining rate is 29.2 million tonnes of ore per annum, resulting in the production of 589,000 tonnes of copper concentrate. The metal contained in the concentrate for 1993 was 203,184 tonnes of copper, 11 tonnes of gold (394,039 ounces) and 26 tonnes (904,688 ounces) of silver. The gold rich, copper depleted oxidised cap was mined between 1984 and 1988, prior to the commencement of copper mining. The mine product is a copper concentrate consisting of 33 per cent copper, with contained economic gold and silver. The concentrate is piped 137 km to the Fly river port of Kiunga where it is dried for shipment. For 1993 the value of concentrate exported from Kiunga was K381.1 million. Since that time the Kina has been devalued and copper prices have increased. At Kiunga the concentrate is loaded onto barges and shipped 800 km to the Island of Umada in the Fly River delta, (refer to Figure 1). International freighters ship the concentrate from Umada to customers in Europe and Asia.

The reserves at Ok Tedi as of May 1993 were 510 million tonnes averaging 0.69 per cent copper and 0.63 grams per tonne (g/t) gold. At the current mining rate of around 29.2 million tonnes per annum (80,000 tonnes per day) this resource will be adequate for mining to continue until 2011.
The Economic Impact of Ok Tedi

The interests of the local people as part of the development of the Ok Tedi project were recognised by Kennecott even during the exploration phase up to 1975. Kennecott established a school at the base camp and undertook an extensive training and scholarship programme to prepare the local residents to play a role in the future mine development. The PNG Government was intent on the mine committing itself to the local people through the relevant legislation. The PNG Mining (Ok Tedi Agreement) Act 1976 required the company to provide employee preference to locals and provide a Business Development Program for local business enterprises. The nature of these businesses was specified in the legislation and included, road construction and maintenance, site preparation, trading enterprises, town services and the supply of food.

The PNG Government benefits from the Ok Tedi mine through the generation of financial receipts on exports, employment, resource rentals and other statutory payments. A total of about 4 000 Papua New Guineans are either directly or indirectly employed by the mine. The total contributions to the PNG economy in 1993 in Kina were (one Kina is about A$1):

- K 5.9 million tax paid on mine imports;
- K 6.5 million in employee income tax;
- K 7.8 million in dividends on preference certificates;
- K 10.2 million in road user fees;
- K 4.65 million in royalties (shared between Western Province Government and landowners);
- K 2.9 million (excluding salaries) for regional development programmes.

The total export earnings from Ok Tedi in 1993 were K381.1 million, or 15.6 per cent of PNG’s exports. OTML supports 55 local business development programmes with a turnover of K63 million in 1993 and employing 1 100 Papua New Guineans. For people outside of the mine lease area the Lower Ok Tedi/Fly River Development Trust has been created. The trust commenced in 1990 with an annual budget of K2.5 million indexed to the Consumer Price Index. One hundred and two villages along 1 000 km of the rivers are assisted, the expenditure excluding salaries up to 1994 being K10.9 million. Projects have included classrooms, halls, water tanks and business development schemes. Compensation for the impact caused by OTML’s activities, such as damage to gardens, bushland and economic trees, is separately payable to landowners when individual claims are determined by the Government.

OTML has established medical aid posts and clinics in villages along the Fly River system, particularly in the North Fly region. The company treats more than 12 000 patients a month at the Tabubil Health Centre and operates mass X ray screening for tuberculosis or respiratory diseases. Since the Ok Tedi mine began operation in the North Fly area, the general health of the community has improved significantly. Infant mortality has fallen from
33 per to less than 3 per cent and the average life span has increased by 20 years from 30 to over 50 years. Additionally the incidence of malaria has dropped from 70 per cent to less than 10 per cent. OTML has commissioned public health programmes including the sewerage and sanitary land fill control, typhoid detection, the control of mosquitoes and the monitoring of food handlers and drinking water.

Regional development opportunities have been created for local business people from increases in the provincial budget derived from mine payments in addition to specific programmes. The Ok Tedi Agreement provides a preference for local residents as employees and business partners. The development of Ok Tedi has substantially improved telecommunications and national air links.

Through the development focus brought on by the mining operation, the National Government in effect defaults on its responsibilities in the area. Often this situation is characterised by a failure of government services in the local area; when that happens the mining company becomes a de facto government. If not for the mine it quite unlikely any of these benefits would be in place. Local development by a large mine is also the case at other locations in PNG, such as Misima, Porgera and the closed Panguna mine on Bougainville.

The closure of the Panguna mine on Bougainville in 1990 and a simultaneous reduction in export income from tree cash crops (coffee, cocoa and copra) increased the importance of the Ok Tedi mine to the PNG economy, to 45 per cent of export revenue. By 1993 the singular importance of the Ok Tedi mine to PNG’s export income had fallen to 15.6 per cent. At the time of the closure of the Panguna mine the PNG Government adopted structural adjustment measures advocated by the International Monetary Fund aimed at export led growth. The strategy of export led growth included a reduction in public sector and government spending, an expediting of foreign investment, currency devaluation and a lowering of import duties. Some analysts blame this resource led export growth ideology for initiating PNG’s economic problems.

The mining industry has a precedence in PNG which is surpassed by only a few countries, as it accounts for 62 per cent of the nation’s exports. Consequently PNG may be recognised as a mineral dependent economy. Mineral dependent economies in lesser developed countries are often recognised as the antithesis of sustainable development. The lesser developed country can provide few inputs to mining and their share of revenue (mainly as resource rents) may be spent on conspicuous imported consumer goods. A high exchange rate is created for the local economy, making other local industries internationally uncompetitive. When shocks such as a fall in the price of a dominant mineral export, the closure of a major mine or a rise in oil prices occurs, the economy crumples.

A consequence of financial stress within a mineral dependent economy is the failure to upgrade environmental standards for reasons of cost. Examples of this exist outside of
economies which are strictly mineral dependent, i.e. the Mount Lyell mine in Tasmania until 1994, but are more common in the mineral dependent economies of lesser developed countries. The importance of the mine to the mineral dependent national economy can preclude the option of mine closure.

A mineral dependent economy is avoided in countries where the local economy is large enough to supply a large proportion of the mining industry's supplies or inputs, particularly those associated with technology. Alternatively the problem is ameliorated when most of the export income remains in that country. A relevant example of this is Australia in which minerals form the highest proportion exports in any developed nation, around 40 per cent. Benefits accruing from a mineral operation generally go well beyond the operation, into the manufacturing and service components of the economy.

When concerns of a local population are exacerbated by the cash flow from mining going to a conspicuous favoured few, the eventual consequence may be armed insurgence. While the situation at Ok Tedi has not reached this level and legal options remain open, the decline of control in mineral dependent economies is well documented elsewhere. A solution to mineral dependence is not readily available and requires macro management of the economy and economic diversification to provide mining inputs and the development of other internationally competitive industries. Otherwise, a vicious circle may develop as the country has no viable alternative but to encourage more mining operations. This in turn perpetuates a culture of living off 'rents'. Compensation payments such as greater free equity for the local government are the main economic consequence rather than the provision of economic inputs. The planned development of Lihir gold mine off the east coast of New Ireland in which the PNG Government is a part owner, is a further example of this situation. It can be readily demonstrated that it is in the PNG Government's interest, for national, provincial and local reasons, to provide a stable climate to facilitate investment provided there is a more appropriate macro management of the economy.

Being a part owner and the regulator of the Ok Tedi mine is a key problem for the PNG Government. The Bougainville mine of which it was a part owner is now closed, and discontent has been voiced through legal challenges to the part owned Ok Tedi. The Lihir mine will produce more gold than the Kalgoorlie area, is now being developed but is also part owned by the PNG Government. The involvement in the mine by the Government raises questions about the regulation regime for environmental and other standards pertaining to the mining operations.

During a visit to the Ok Tedi mine in 1994, Robert Tickner, the Minister for Aboriginal and Torres Strait Islander Affairs, recognised the significant benefits which local landowners and adjacent communities have received from the mine development. Mr Tickner said, "The very real commitment and achievements of Ok Tedi Mining Ltd in ensuring that the vast economic benefits of mining are shared with the local communities provide a real lesson for Australian mining companies".
The preference for local employees was clearly recognised by Mr Tickner who stated that "as of March 1994, 88% of the 1 875 people directly employed by Ok Tedi Mining Ltd were PNG citizens and 33% were from the local area" and "additionally the company, in conjunction with the PNG Government, has established business development programs and, as a result, more than 45 land/owner companies have been established turning over $50 million a year and employing more than 1 200 local people."

OTML's efforts in assisting the development of the provincial area, particularly those communities which are outside the Ok Tedi mine lease area and which do not receive direct royalty or lease payments was recognised by Mr Tickner and he said "The trust operates in 102 village communities stretching for over 800 km along the adjacent Fly River system." Mr Tickner also referred to the specifics of OTML funding: "over a three-year period, 1990-1993, the trust allocated $14 million to predominantly sustainable long-term capital development projects in those communities."

A telling interpretation of the mine's impact comes from Michael Abramsky a former professional employee with the OTML who describes his experience of a mining camp in jungle, surrounded by a stone age culture. Mr Abramsky claims that the impact on the local population is not simply a case of measured particulate levels, scientific studies, baseline levels or river studies. Prior to the development of the Ok Tedi mine, the Min people took days to cut down a tree with a stone axe. Mining commenced and suddenly the rivers went brown red. The local people did not realise the impact, they were catapulted into the 20th century. Mr Abramsky was personally 'shocked' that the mine went ahead without the planned tailings dam.

Environmental Issues

The Ok Tedi mine operates to environmental standards established and regulated by the PNG Government. The standards were established after more than eight years of research covering 1 200 kilometres of the Fly and Ok Tedi receiver systems, the Gulf of Papua and Torres Strait. The Government established a maximum sediment load that can be contributed by the mining operation to the Fly River system. The limit was established in September 1989, and is termed the Acceptable Particulate Level (APL). A key concern about these limits however, is that as a part owner of the mine, the PNG Government is in effect regulating itself.

OTML's environment department has a staff of 35 and an annual budget of K$5 million (about $5 million). Some work is being carried out in collaboration with the Australian Institute of Marine Sciences, the Institute of Soil Fertility, the Delft Hydraulic Laboratory in the Netherlands and the Great Barrier Reef Marine Park Authority.
OTML has consistently complied with the APL of 940 milligrams/litre (mg/l) with the mine’s contribution to sediment levels generally about half this. Suspended sediment below the confluence of the Ok Tedi and the Fly averages 450 mg/l, compared with 130 before mining and 700mg/l in the Strickland River, the major Fly tributary unconnected to the Ok Tedi mine. An average 58 million tonnes a year of ore residue and overburden is discharged to the Ok Tedi. About 40 million tonnes of this reaches the Fly River. 100 million tonnes of natural sediments are carried by the Fly River annually.

Monitoring indicates that in terms of sedimentation, an equilibrium has been achieved in the river system and further change is not anticipated. The reality of this level of sediment in the Ok Tedi River is a raising of the bed of the river, which in places has carried sediment into adjacent crop gardens. The waste from the mine is not toxic or poisonous and contains less than 0.1 per cent copper with some zinc, cadmium and lead. Due to its volume however, the waste smothers vegetation and is not particularly fertile. Dry soils at the river’s edge are now water logged due to the rise in river and consequently vegetation at the edge has died. This smothering of vegetation and raising of river level continues some 100 km downstream of the mine, to the Ok Tedi’s confluence with the Fly River. Research by the mine indicates that the situation has stabilised, and no major changes are likely until the mine’s closure in 2011.

Additional conditions were imposed in relation to allowable particulate (solid material suspended in the water) and dissolved copper concentrations, and the maintenance of fish stocks. Copper concentrations are generally less than one quarter the maximum permissible level for the PNG, Australian or World Health Organisation standards for drinking water. Copper concentrations in fish flesh have not increased to levels prescribed as of concern. Fish numbers have been severely reduced in the Ok Tedi River and reduced in the Fly River immediately below the junction due to the turbidity. No reduction has been recorded in the lower Fly River or side streams. Copper concentrations in fish and sediment in the lower Fly and the off river wetlands however, have been elevated by mining.
Table 1:
Comparison of the Fly River with Other Recognised Systems.

<table>
<thead>
<tr>
<th>Name, Location</th>
<th>Discharge/year (m³/s)</th>
<th>Drainage Area (km²x1,000)</th>
<th>Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon, South America</td>
<td>203,800</td>
<td>7,180</td>
<td>6,300</td>
</tr>
<tr>
<td>Mississippi-Missouri, North America</td>
<td>17,600</td>
<td>3,221</td>
<td>6,300</td>
</tr>
<tr>
<td>Fly, Papua New Guinea</td>
<td>6,000</td>
<td>76</td>
<td>1,120</td>
</tr>
<tr>
<td>Murray-Darling, Australia</td>
<td>370</td>
<td>1,072</td>
<td>3,770</td>
</tr>
</tbody>
</table>


While these levels are within existing standards there are concerns that a chronic impact may be recognised in the future. Concerns about the impact of elevated copper concentrations on the local population in PNG and Torres Strait have been raised by the Australian Conservation Foundation as many of the people rely heavily on the consumption of fish for protein. While surveys have shown no decrease in fish numbers, villagers in the lower Fly claim that fish are more difficult to catch due to increased turbidity. Baseline studies have recorded no evidence to date, of metal contamination from the mine, bearing in mind that the residence time for sediment in the Fly is estimated at 15 years.¹²

Legal Challenges

The villagers downstream of the mine filed liability claims in May 1994 both in PNG and Australia over the river pollution. Seventy one land holders representing around 30 000 villagers are involved in the claim for $4 billion. The Australian law firm representing the villagers is Melbourne based Slater and Gordon. Australia’s involvement in the mine is through the site manager and main owner of Ok Tedi Mining Ltd (OTML), Broken Hill Proprietary (BHP). The PNG Government and BHP have negotiated a settlement which provides $110 million (K110 million) in compensation for the villagers. It is unlikely that the $110 million compensation package would have occurred if Slater and Gordon had not intervened with the action against BHP in Australia.¹³

Ok Tedi is not alone in having a claim for environmental compensation being heard outside of the country where the problem has occurred. The multinational oil company, Texaco is the defendant in what is known as the *South American Oil Contamination* case. Residents of Ecuador (and more recently Peru) have filed actions in the United States (New York and Texas) claiming compensation for alleged contamination of air, ground and water in
Ecuador. The alleged injuries are claimed to affect as many as 500 000 Ecuadorians over a third of the country.

The claim was immediately dismissed in Texas, but in New York the court has established that it has jurisdiction. Although numerous allegations were made, a single claim obtained legal recognition. That is, the alleged misconduct resulting in the damage occurred in the United States. The defendant's multiplicity of defences "were dismissed by a court which seems to have bent over backwards to facilitate the plaintiffs' successful proof of its cause of action." The court decided that most pertinent authority in this case is the Rio Declaration on Environment and Development, which arguably provides the policy framework for this case. The court established a precedent in deciding to hear the case, it is likely this situation will occur elsewhere.

If the mine is forced to shut or curtail operations as a result of legal actions, the PNG stands to loose 15.6 per cent of its exports, along with the other economic benefits of mining. BHP is supporting a current independent PNG Government sponsored study into the building of a tailings dam for the operation. If a tailings dam is built at a cost which is not prohibitive to the future operation of the Ok Tedi mine, the key problems associated with the mine in the local area would be removed. The legislation which supports the S110 million compensation agreement is due to go before the PNG Parliament in September 1995 as the Eighth Supplemental Ok Tedi Agreement. Concerns have been raised about provisions within the proposed legislation which make it a criminal offence for anyone to take court action against the Ok Tedi mine for compensation for pollution, loss of property or environmental damage.

These are some of the issues for the mine at the present, future issues of potentially greater complexity are likely to arise for the PNG Government with the closure of the Ok Tedi mine in 2011. The damage to the Ok Tedi River downstream of the mine would cease soon after mine closure. The infrastructure and economic base created by mining would remain and continue to function but may decline over time.
Endnotes

2. BHP deal to bar Ok Tedi compo cases, *The Australian*, 10 August 1995.