Ok Tedi Mine – leaving time bombs on the Fly River floodplain

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Ok Tedi Mine

- One of the world’s largest copper mines
Ok Tedi Mine

• Located in the Star Mountains, Papua New Guinea
Ok Tedi Mine

• Since 1987 ore has been processed on site to produce copper concentrate which is piped to Kiunga and then shipped down river by barge.
Ok Tedi Mine

- The mining company, OTML, is owned by the Government of PNG (30%), Inmet Mining (18%) and PNG Sustainable Development Program Ltd (52%)
Ok Tedi Mine

• In 2007 OTML contributed 32% of PNG’s export earnings.
Ok Tedi Mine

- The mine has been controversial, with the environmental impacts far exceeding those predicted in the EIA.
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- Waste rock and mine tailings are disposed of by dumping into local rivers – about 90 million tonnes per year.
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- The impact on the Ok Tedi was always anticipated to be severe – but severe impacts were not anticipated on the Fly River.
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• But sediment aggradation in the Fly River has changed the flooding regime in the middle Fly – leading to extensive floodplain forest dieback.
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• Over 160 km$^2$ of forest have been impacted
There is also concern that fish populations in the Fly River, an important protein source for local people, have declined.
To reduce the flooding problem, and to keep the river open for navigation, OTML is dredging sediment from the Ok Tedi at Bige.
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- and storing it on the Bige floodplain.
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• The ore being mined is rich in sulphides, with higher sulphide (and metal) levels deeper in the ore body.
• Tailings and waste rock rich in sulphides oxidize when exposed to air causing acid rock drainage (ARD or AMD), the leaching of very acid water with high levels of (toxic) metals.
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- Acid rock drainage has long been recognized as a potentially serious long term environmental impact from mining where the ores are sulphidic.
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- OTML have been trying to counteract that impact by dumping extra limestone into the Ok Tedi, with some success.
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- PROBLEM: as sulphide content in the ore increases, limestone neutralization will become impractical.
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- SOLUTION: build a tailings treatment plant to remove much of the sulphide, and dump it in a pit at Bige.
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- Effect: reduce the future potential for ARD in the Ok Tedi
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Two larger issues, as yet not addressed:

1. Mine derived sediment already deposited on the flood plain is acid forming.
1. Sediment on the flood plain.

Extensive deposits up to 150m from the river channel, over 4m deep in places.

If (when) it dries out, it will trigger ARD
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Sediment on the flood plain.

Already small patches have dried and acidified.

Likely to become far more extensive

Ecological consequences not addressed by OTML or the PNG Govt.
2. In future the high sulphur waste dumped at Bige will leak into the river.
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High sulphur waste leakage.

Waste stored below groundwater level close to the river.

Eventually the river will cut through and release this material into the middle Fly River.
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High sulphur waste leakage.

Before the PNG Government approved the MWTP they assessed whether the dredge piles would last 400 years.
Ok Tedi Mine

High sulphur waste leakage.

Before the PNG Government approved the MWTP they assessed whether the dredge piles would last 400 years— but not whether the river would erode into the sulphide waste pits.
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High sulphur waste leakage.

Effect could be catastrophic.

Bige is close to the Ok Tedi Fly River Junction
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High sulphur waste leakage.

Effect could be catastrophic

The material released will be at far higher concentration than if it were discharged to the river directly from the mine.
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High sulphur waste leakage.

Effect could be catastrophic.

It will then disperse across the floodplain, adding to the existing problem.
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High sulphur waste leakage.

Effect could be catastrophic

OTML & PNG Govt apparently hope someone will dig up and process the material before this happens.
Hope has never been a viable environmental protection strategy.
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The obvious options are to:

- Close the mine early (before high sulphide ore is mined)
- Require OTML to process the waste
- Find a more secure storage location
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The regulatory processes for the Ok Tedi mine have repeatedly been ineffective.