

Impacts on water quality

Borneo's main cities are located along rivers and near the coast. Households and industries such as fisheries are dependent on the quality of water in these rivers. Due to low discharges in the dry season, salt water is penetrating further inland during high tide and affecting the quality of water supply. Saltwater intrusion is a serious problem in the cities of Pontianak (West Kalimantan) and Banjarmasin (South Kalimantan). Groundwater in the coastal lowlands is usually brackish; in Kalimantan, it also contains high levels of iron, which make it unsuitable as a source of drinking water.

In order to meet World Health Organization (WHO) drinking water quality standards, water utilities in Borneo are exploring various options for securing water supplies, including dam construction, freshwater reservoirs and searching for alternative, inland water sources. However, none of these options is cheap, and all have negative externalities associated with them. Box 2.3 below illustrates the situation in Pontianak, where the cost of obtaining water from an intake 25 km upstream is estimated at US\$2 million per year.

Increased soil erosion results in transport of nutrient-rich litter and topsoil in overland flows to streams. The consequences are many, including eutrophication of streams, which may affect species diversity in the river systems. The extensive use of fertilizer and pesticides by palm oil and agriculture plantations has additional water quality impacts. Some of these plantations use agrochemicals excessively or improperly dump POME into rivers and streams (see above Chapter 2.3, section on palm oil cultivation, for more details). Fertilizers can be removed by water treatment companies through the use of sand filters and /or biological treatment. Pesticides are much more difficult to remove, however, requiring complex and expensive treatment systems using membranes, oxidation or active coal.

Another water quality issue related to deforestation is a high pH level. This may occur when forests are cleared and groundwater tables are deliberately lowered in order to convert peatland into agricultural land.

Finally, serious pollution (e.g. mercury, manganese, cyanide, acidic waters) can result from mining activities undertaken without proper chemical and wastewater treatment.



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Declining seasonal flows in the Kapuas and Landak Rivers result in increased saltwater intrusion, with significant impacts on drinking water quality.



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IMPACTS OF MINING ON WATER QUALITY Sumadi, 45, Desa Harowu-District, Gunung Mas, Central Kalimantan, Indonesia:

"Most of the villagers are now engaged in gold mining for a livelihood: mining has thoroughly contaminated the river and destroyed its quality as well as caused damages everywhere. As for the impacts, most of the rivers in which mining occurs can no longer provide other benefits, such as fish and drinking water for the community. This situation was very different 15 years ago, when there was no mining. We were able to catch fish easily. We could even see fish from the surface of the river. Children could swim along the river at that time. I often drunk the water directly from the river. Now, no one dares to drink the water from the river, because of health impacts. Oh, how I wish we could bring the past back with us to the present time."



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IMPACTS OF PALM OIL EXPANSION ON WATER QUALITY AND SUPPLY

Lukas Subardi, Director of Sanggau, local-government-owned drinking water utility, West Kalimantan, Indonesia:

Lukas is concerned by the rapid expansion of palm oil plantations in West Kalimantan: "In the dry season, all of the smaller rivers are dry due to the endless deforestation of the Kapuas natural forest... in the rainy season, the river water is very turbid and heavily polluted by waste from leaching chemicals such as herbicides, pesticides, industrial waste, sludge, silt, etc... all due to expansion of oil palm upstream." (Lukas's blog is at <http://pdamsanggaukapuas.blogspot.com/>)

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To increase the capacity of water distribution in the dry season, the city of Pontianak in West Kalimantan is constructing a second pipeline to extract water from further upstream at an additional cost of over US\$10 million.

Box 2.3: Costs of water supply for the city of Pontianak, West Kalimantan¹⁰³

During the dry season (July-October), discharge of the rivers Kapuas and Landak to the sea decreases, leading to saltwater intrusion during high tide. As a result, salinity in the rivers increasingly affects the quality of the water intake for the city of Pontianak. If the salinity of the intake water rises above 600 mg/l, the water utility (PDAM Kota Pontianak) pumps backup water from Penepat, 25 km away from Pontianak, resulting in increased operational costs due to fuel consumption by the pumps.

Current costs - In 2009, Pontianak's water utility spent US\$140,000 to pump 2.2 million m³ of water from the intake 25 km upstream of the city of Pontianak. To increase the capacity of water intake from Penepat during the dry season, the Public Works Department has already begun construction of a second pipe from Penepat to Pontianak. This pipeline will have a capacity of 500 l/s and is estimated to cost over US\$10 million.

In the dry season, when Pontianak relies completely on Penepat for its water intake, the production capacity is insufficient to meet the city's demand of 1080 l/s. As a consequence, the water utility needs to ration water supply by supplying parts of the city only during certain hours of the day. When the Penepat pipeline is not operational because of mechanical problems or lack of fuel (which is the case about 70 per cent of the time), the water supply is completely cut off and customers have to collect drinking water from distribution reservoirs.

Future costs - At the moment, 68 per cent of Pontianak's inhabitants are connected to the distribution network. The city plans to expand connectivity to 80 per cent in the near future. Under this scenario, and assuming 80 per cent operational time and full capacity intake from Penepat during the dry season, the total cost for pumping the required water to the city would increase to US\$2 million/year. In case of extreme drought events like in 1997¹⁰⁴ and 2002, the cost would exceed US\$2.5 million/year.