Total Mercury and Methylmercury Levels in Fish from Hydroelectric Reservoirs in Tanzania

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Abstract

Total mercury (THg) and methylmercury (MeHg) levels have been determined in fish species representing various tropic levels in four major hydroelectric reservoirs (Mtera, Kidatu, Hale-Pangani, Nyumba ya Mungu) located in two distinct geographical areas in Tanzania. The Mtera and Kidatu reservoirs are located along the Great Ruaha River drainage basin in the southern central part of the country while the other reservoirs are located within the Pangani River basin in the north eastern part of Tanzania. Fish mercury levels ranged from 5 to 143 μg/kg (mean 40 μg/kg wet weight) in the Mtera Reservoir, and from 7 to 119 μg/kg (mean 21 μg/kg) in the Kidatu Reservoir downstream of the Great Ruaha River. The lowest THg levels, in the range 1–10 μg/kg (mean 5 μg/kg), were found in fish from the Nyumba ya Mungu (NyM) Reservoir, which is one of the oldest reservoirs in the country. Fish mercury levels in the Pangani and Hale mini-reservoirs, downstream of the NyM Reservoir, were in the order of 3–263 μg/kg, with an average level of 21 μg/kg. These THg levels are among the lowest to be reported in freshwater fish from hydroelectric reservoirs. Approximately 56–100% of the total mercury in the fish was methylmercury. Herbivorous fish species contained lower THg levels than the piscivorous species; this was consistent with similar findings in other fish studies. In general the fish from the Tanzanian reservoirs contained very low mercury concentrations, and differed markedly from fish in hydroelectric reservoirs of similar age in temperate and other regions, which are reported to contain elevated mercury concentrations. The low levels of mercury in the fish correlated with low background concentrations of THg in sediment and flooded soil (mean 2–8 μg/kg dry weight) in the reservoir surroundings. This suggested a relatively clean reservoir environment that has not been significantly impacted by mercury contamination from natural or anthropogenic sources.

Keywords

Mercury;
Methylmercury;
Fish;
Hydroelectric reservoirs;
Tropical regions