Mercury Concentrations in Water, Sediment, and Biota from Lake Victoria, East Africa

Patricia S. Ramlal1,*, Fred W.B. Bugenyi2, George W. Kling1, Jerome O. Nriagu3, John W.M. Rudd4, and Linda M. Campbell5

1Department of Ecology and Evolutionary Biology
University of Michigan
Ann Arbor, Michigan 48109

2National Agricultural Research Organization
Fisheries Research, Institute
P.O. Box 343
Jinja, Uganda

3Department of Environmental and Industrial Health
School of Public Health
University of Michigan
Ann Arbor, Michigan 48109

4Canadian Department of Fisheries and Oceans
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba R3T 2N6

5Canada Centre for Inland Waters
Environment Canada
867 Lakeshore Road
Burlington, Ontario L7R 4A6

ABSTRACT. Lake Victoria, East Africa, is the site of the world’s most productive freshwater fishery. Mercury in muscle tissue of the 2+ and 3+ year old Nile perch (Lates niloticus), presently the largest constituent of the fishery, was 90 to 250 ng/g wet weight. This is similar to the range of mercury in fish muscle reported for the commercial fish of the Laurentian Great Lakes (140 to 320 ng/g). The average total mercury in the water column (7.5 ng Hg/L; n = 14) was at the upper range normally defined for uncontaminated water (< 10 ng Hg/L). The average mercury concentration in the solid phase of the top 10 cm of sediments was 220 ng Hg/g close to that found in the surface sediments of the Laurentian Great Lakes. Methylmercury measured in the surface water near a variety of wetland vegetation was low with the possible exception of water collected near the roots of the water hyacinth, Eichhornia crassipes. Although the levels of mercury in fish are within the accepted guidelines of the FAO/WHO, the people living in the vicinity of the lake are likely to consume a greater quantity of fish than those living some distance away from the lake. It is important to educate the consumers of the fish from Lake Victoria about any potential risks and to monitor the fish mercury levels.

INDEX WORDS: Lake Victoria, mercury, contaminants, tropical lakes.

*Corresponding author. E-mail: RamlalP@dfo-mpo.gc.ca
Current address: Canadian Department of Fisheries and Oceans, Freshwater Institute, 501 University Crescent, Winnipeg, Manitoba R3T 2N6
INTRODUCTION

Lake Victoria, East Africa, is currently the site of the world’s most productive freshwater fishery with annual yields exceeding 500,000 metric tons (Ogutu-Ohwayo et al. 1996). There is increasing industrialization in the watershed and a large human population that relies on the fish in the lake as a primary source of animal protein. In spite of the tremendous importance of fish to the diet of the local population, as well as an export commodity, few studies have been done on measurements of mercury (Hg) in fish muscle, or of the aquatic environment of Lake Victoria in general. Ikangura and Akagi (1996) monitored fish and human exposure to Hg near the Lake Victoria gold fields in Tanzania. They found low Hg concentrations in fish (1.8 to 16.9 ng Hg/g; mean 7.0 ng Hg/g), and that gold mining had not produced a significant increase in environmental methylmercury (MeHg) concentrations. No published results were found for biota, water, or sediments collected from the northern area of the lake. With such a large population dependent upon the fish protein it is important to know what, if any, role Hg might play in the quality of the fish being consumed. Also Hg concentrations in a large tropical lake were compared to those of the North American Great Lakes.

METHODS AND MATERIALS

Lake Victoria is the second largest of the world’s great lakes in terms of surface area, the largest of the African Great Lakes, and the largest eutrophic lake in the world (Hecky and Bugenyi, 1992, Hecky 1993, Hecky et al. 1994, Mugidde 1993). Despite the fact that it covers a vast area (68,800 km²), Lake Victoria is relatively shallow; the maximum depth of the lake is only 69 m (Johnson et al. 1996) and the mean depth has been estimated to be 40 m. The pelagic euphotic zone of the lake has decreased to ~7.5 m from ~15 m in the early 1960s (Hecky 1993) and even greater changes have occurred in nearshore areas (Mugidde 1993). Water residence time in Lake Victoria is 23 years with direct precipitation and evaporation on the lake’s surface dominating the water budget (Bootsma and Hecky 1993).

The study area was located mainly near Jinja on the northern shore of the lake (Fig. 1). At the time of this investigation there were no industrial sources of Hg near Jinja. However, on Napoleon Gulf there were some industries including a fish processing plant and tannery. In the past a copper mine and processor had been located in the vicinity of Napoleon Gulf. There is also a great deal of biomass burning that occurs around the shoreline. Biomass burning is used as an agricultural practice to promote the productivity of grazing land, to clear land for cultivation, and required in the production and use of charcoal. Nriagu (1992) estimated that 300 metric tons of Hg are emitted via burning of forests and savannas on the African continent every year.

The collection sites of water for MeHg determination were mainly from the surface water of marginal wetlands near a variety of macrophyte types. These included Phragmites (reeds), Cyperus (papyrus), Vossia (hippo grass), and Eichhornia crassipes (water hyacinth). The outflow of a stream in Napoleon Gulf and the open water in Napoleon Gulf (Fig. 1) were also sampled. Water profiles were collected from a deep (66 m) offshore station near Bugaia Island and in Napoleon Gulf near the city of Jinja (Fig. 1). Sediment cores were collected...
from Itome Bay near Buvuma Channel (Fig. 1) from a water depth of 25 m. Johnson et al. (1998) provided material from an offshore 14C-dated piston core collected where the depth of the overlying water was ~ 68 m (V96-5MCA; 1° 40.4′S; 33° 9.1′E) for total mercury analysis. Fish and other biota were collected from Napoleon Gulf and near Bugaia Island.

Water sample bottles were cleaned and prepared as described in St. Louis et al. (1994) and their protocol for the “clean hands, dirty hands” technique was followed. Surface water for analysis of MeHg was collected in 125-mL Teflon bottles, kept dark and cool, and transported to North America within a few days of collection. Unfiltered MeHg samples were analyzed according to the procedure of Bloom (1989). The detection limit of this method is 0.01 to 0.02 ng Hg/L at a blank level of 0.05 to 0.1 ng Hg/L. The blank level in the samples was 0.03 ng Hg/L. Water for total Hg (THg) analysis was collected also using the “clean hands, dirty hands” technique, preserved with trace metal grade 6N HNO3, and analyzed within a few days to a few weeks of collection. Unfiltered MeHg samples were analyzed according to the method of Bloom and Cre-celius (1983). Profiles of dissolved oxygen (mg/L) was collected in 125-mL Teflon bottles, kept dark and cool, and transported to North America within a few days of collection. Unfiltered MeHg samples were analyzed according to the procedure of Bloom (1989). The detection limit of this method is 0.01 to 0.02 ng Hg/L at a blank level of 0.05 to 0.1 ng Hg/L. Water for total Hg (THg) analysis was collected also using the “clean hands, dirty hands” technique, preserved with trace metal grade 6N HNO3, and analyzed within a few days to a few weeks of collection. Unfiltered MeHg samples were analyzed according to the method of Bloom and Cre-celius (1983). Profiles of dissolved oxygen (mg/L) was measured with a Hydrolab Surveyor II, cross-calibrated with Winkler titrations.

Sediment cores were collected from Itome Bay using a KB corer. These cores were sectioned at the laboratory in Jinja and frozen until the time of their analysis. One of the cores was dated using 210Pb analysis (Oldfield and Appleby 1984, Robbins 1978) at the Freshwater Institute (FWI; Winnipeg, Manitoba, Canada). Another was sent to the University of Michigan (Ann Arbor, Michigan, USA) for analysis of mercury in the solid phase. For comparative purposes the V96-5MC core, taken in 1996 by Johnson et al. (1998) near the middle of the lake, was also analyzed for total Hg in the solid phase at the University of Waterloo.

For this study most of the measurements of mercury in fish were done on the Nile perch (Lates niloticus). These fish are the most successful predator and in the waters of Lake Victoria can reach sizes greater than 100 kg, although most of the fish harvested are between 2 to 4 kg at ages 2+ or 3+ years (Kitchell et al. 1997). The other major components of the fishery are the Nile tilapia (Oreochromis niloticus) and a small zooplanktivorous cyprinid Rastineobola argentea (Ogutu-Ohwayo 1994). The fish were collected by trawl from the R/V Ibis. Other fish collected for analysis include Brycynus sp. and some small haplochromines. Tissue samples from behind the dorsal fin were excised, air-dried and kept in glass or plastic vials until their return to North America. Whole bodies of R. argentea, and the shrimp Caridina nilotica were dried and kept in foil or plastic until the time of analysis. Nile perch collected in February 1995 were analyzed at the FWI following the methods of Hendzel and Jamieson (1976). Subsequent collections of biota were analyzed at the University of Michigan using microwave digestion methods and nondispersive atomic fluorescence spectrometry (Bloom and Fitzgerald 1988).

Measurements of THg on biological material were made using dried materials. A correction factor of 0.31 dry:wet weight was applied to the fish samples because generally only wet weights were available. This correction was determined using the weights of five Nile perch of various sizes before and after drying the entire fish and the mean ratio was 0.311 ± 0.004 dry:wet weight. Fish were dried at 60°C until a constant weight was reached. These estimates of dry:wet weight are similar to others measured on Lake Victoria Nile perch (P.N. Reinthal, pers. comm.).

RESULTS AND DISCUSSION

THg in water profiles ranged from 3 to 15 ng/L (Fig. 2). The highest concentration, 15.5 ng Hg/L, occurred at 40 m depth. THg in Napoleon Gulf averaged 3.2 ng/L at 1 m and 4.1 ng/L at 13 m. These concentrations are above what would be expected in uncontaminated water. For example Mason and Sullivan (1997) measured average THg concentrations of 0.32 ng/L in Lake Michigan waters. The sulfate concentration in the Bugaia profile ranged from 13 to 16 µM (unpublished results). The bottom waters at Bugaia were becoming anoxic by late October 1995 when the concentration of oxygen was < 2 mg/L below 40 m (Fig. 2). By late December the water below 40 m was completely anoxic.

Levels of MeHg observed in the surface waters of Napoleon Gulf were often low (Table 1); in some cases the concentration was less than 2 times that of the distillation blank (0.031 ng Hg as MeHg/L). These values are higher than would be expected in wetlands (St. Louis et al. 1994). Lucotte et al. (1999) measured an average MeHg concentration of 0.049 ng/L (range 0.018 to 0.115; n = 30) for several remote lakes of northern Quebec. The low concentration of MeHg found in
these waters was unexpected because wetlands are often considered to be a source of MeHg to aquatic systems although these are generally sphagnum wetlands of the temperate and subarctic climates (St. Louis et al. 1994). The mean MeHg concentration for all sites monitored in Napoleon Gulf was 0.096 ± 0.026 ng/L. There may be some indication of higher MeHg concentration in the water found near the roots of the water hyacinth (0.141 ng Hg as MeHg/L) but more measurements in and around the water hyacinth are necessary to determine if this value is statistically different from the other values. It may be necessary to sample the biota associated with water hyacinth that are frequently found near the root system of the floating mat (Caridina niloticica, juvenile Nile perch, etc.).

It is presently unclear why the measured MeHg concentrations in the water were so low. Lake Victoria has among the lowest sulfate concentrations of any lake in the world, ~ 15 µM (Giblin et al. 1996, Hesse 1957, this study). However, net sulfate reduction was low to almost undetectable in the surface sediments of cores collected from inshore and offshore sites (unpublished data). Although sulfate-reducing bacteria are believed to be the major bacterial group responsible for MeHg production in aquatic systems (Gilmour and Henry 1991), sulfate reducers can be active and methylate mercury in the absence of sulfate.

One of the cores taken at Itome Bay was dated using excess 210Pb accumulation in the sediments (Fig. 3). Based on the theoretical 210Pb flux the current sedimentation rate was calculated as 276 g/m²/y. This inshore rate is considerably higher than the estimated sedimentation rate (90 to 110 g/m²/y) of a core taken off the western shore of Lake Victoria near Kisumu with an overlying water depth of 55 m (Hecky 1993, Lipiatou et al. 1996).

### TABLE 1. Results of methylmercury survey, Napoleon Gulf (Lake Victoria), 2 November 1995.

<table>
<thead>
<tr>
<th>Site in Napoleon Gulf</th>
<th>Net MeHg as Hg ng/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deionized water blank</td>
<td>0.031</td>
</tr>
<tr>
<td>Distillation blank</td>
<td>0.028</td>
</tr>
<tr>
<td>Open water (rep 1)</td>
<td>0.071</td>
</tr>
<tr>
<td>Open water (rep 2)</td>
<td>0.133</td>
</tr>
<tr>
<td>Open water</td>
<td>0.064</td>
</tr>
<tr>
<td>Water near Eichhornia crassipes</td>
<td>0.141</td>
</tr>
<tr>
<td>Water near Vossia</td>
<td>0.108</td>
</tr>
<tr>
<td>Water near Cyperus</td>
<td>0.106</td>
</tr>
<tr>
<td>Water near Phragmites</td>
<td>0.083</td>
</tr>
<tr>
<td>Stream</td>
<td>0.072</td>
</tr>
<tr>
<td>Stream</td>
<td>0.082</td>
</tr>
</tbody>
</table>

FIG. 2. Oxygen and total mercury profile (filled circles) from Bugaia sampling station. Samples collected at Bugaia 21 October 1995. Oxygen measurements taken at 1 m intervals. Mercury results are an average of 3 replicates; error bars indicate the standard error about the mean. Two samples for total mercury from Napoleon Gulf (open circles) were taken on 2 November 1995.

FIG. 3. Excess 210Pb accumulation in the Itome Bay sediments ($r^2 = 0.84$). Sedimentation rate is 276 g/m²/y. Theoretical 210Pb flux is 438 Bq/m²/y.
There was an apparent increase in the THg in the solid phase after ~1962 in both Itome Bay (Fig. 4A) and in the offshore core of Johnson et al. (1998) (Fig. 4B). In a survey of the available African literature Nriagu (1992) suggested a baseline value for Hg in sediments as 40 ng Hg/g, and found that the concentration in aquatic African sediments ranged from 50 to 2,200 ng Hg/g. The recently deposited sediments in Itome Bay (0 to 10 cm, ~15 years) had an average concentration of 220 ng Hg/g, above the baseline value, but near the lower end of the range found by Nriagu (1992). Additionally, the recent sediments of the offshore core, V96-MCA, show a similar trend of increased deposition since the mid-1960s (Fig. 4B). The range of Hg in the surface sediments of Lake Michigan was 30 to 380 ng/g, and Lake Superior was 94 to 160 ng/g (Mudroch et al. 1988). Matty and Long (1995) examined the early diageneis of Hg in the sediments of Lakes Michigan and Superior. They found a mercury concentration gradient that suggested diffusive flux of Hg to the overlying lake water. This is also possibly occurring in Lake Victoria.

Soil erosion from shorelines may account for the rise in Hg since 1960. The normal seasonal change in lake level is 0.2 to 0.4 m but in 1962 there was a > 2 m increase in lake level (Beadle 1981). This > 2 m increase in lake level caused disturbance in the watershed and may be the cause of the increased Hg reflected in the mercury chemistry profiles of the cores (Fig. 4). The results show a peak in the concentration of Hg in the sediments following the early 1960s. This high lake level may be analogous to the increase of lake levels after river impoundment for hydroelectric development. Following the construction of reservoirs which lead to the inundation of terrestrial material it has been shown that the concentration of Hg in the tissue of fish increased dramatically above pre-flooding levels. This increase was attributed to the release and increased mobility of Hg previously sequestered in soil and lake sediments (Bodaly et al. 1984, Hecky et al. 1992). In a study of tropical ecosystems Burger (1997) suggested that the high mercury values of the cattle egret from the Aswan, which feeds on insects, may be due to the recent flooding which could affect the Hg levels in the entire ecosystem. She further suggests that flooding of tropical soils may result in higher Hg concentration because of the rapidity with which organic matter is produced and cycled through the ecosystem. Other possible explanations for the increase in Hg in the sediments besides, or in addition to, the lake level rise may be: (1) a change in land use, particularly in biomass burning; (2) a localized increase in population or industry; or (3) a global increase in baseline Hg concentration (Fitzgerald et al. 1998, Lockhart et al. 1998). Lucotte et al. (1999), among others, has demonstrated that significant amounts of anthropogenic Hg can be transported long distances before deposition. Given that the profiles of total Hg in the solid phase of both of the cores are similar in magnitude, the latter explanation also seems feasible.

The Nile perch, a piscivore, had substantially higher Hg concentrations than did any of the other biota sampled (Table 2), ranging from 293 to 812
ng Hg/g dry weight. Other fish had much lower Hg concentrations, 35 to 110 ng Hg/g dry weight. Although there were only three samples of the Nile tilapia it was interesting to note that as the size of the fish increased from 80 to 1,155 g wet weight there was less Hg in the fish muscle.

When the fish Hg data were corrected for wet to dry weight differences and plotted against the wet weight (Fig. 5) there was only a slight relationship between size and Hg content. The Hg concentrations ranged from 90 to 250 ng/g for Nile perch and from 11 to 34 ng/g for Nile tilapia. The slope of the least squares regression of log Hg (ng Hg/g wet weight) on log wet weight is statistically different from zero at a significance level of P = 0.011. However this relationship is weak compared to other published results (Scott and Armstrong 1972). This is not too surprising because although the weight range is broad it encompasses only 2-year classes. A relationship with Hg and fish weight would be expected only over a much larger age range.

The question still to be considered is “How is it possible to account for the amount of Hg found in the fish?” Using an average sediment mercury concentration of 250 ng/g dry weight and annual sediment deposition rate of 276 g/m²/y, an annual deposition of 69 µg Hg/m²/y would be expected. In Lake Michigan, Mason and Sullivan (1997) determined that about 40% of the Hg at the sediment water interface was recycled. If a similar calculation is applied to the Lake Victoria situation about 50% of the recently deposited Hg may be recycled.

As population and industrial growth continues it will become even more important to monitor the levels of pollutants in the food and water of the people living around Lake Victoria. Nriagu (1992) found emission guidelines were seldom followed (Semu et al. 1986) by industries responsible for

### TABLE 2. Total mercury concentration in the tissue of Lates niloticus and Oreochromis niloticus and whole bodies of other biota.

<table>
<thead>
<tr>
<th>Species</th>
<th>Date sampled</th>
<th>Location</th>
<th>Length cm</th>
<th>Wet Wgt. g</th>
<th>Mean Hg ng/g dry wgt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lates niloticus</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>23</td>
<td>116</td>
<td>439</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>24</td>
<td>142</td>
<td>409</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>24</td>
<td>142</td>
<td>369</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>29</td>
<td>275</td>
<td>617</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>48</td>
<td>1,400</td>
<td>344</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>55</td>
<td>1,950</td>
<td>536</td>
</tr>
<tr>
<td>Lates niloticus (rep 1)</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>71</td>
<td>4,500</td>
<td>605</td>
</tr>
<tr>
<td>Lates niloticus (rep 2)</td>
<td>08-Feb-95</td>
<td>Nap. G.</td>
<td>71</td>
<td>4,500</td>
<td>812</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>30-May-95</td>
<td>Nap. G.</td>
<td>39.5</td>
<td>710</td>
<td>495</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>30-May-95</td>
<td>Nap. G.</td>
<td>39</td>
<td>715</td>
<td>345</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>30-May-95</td>
<td>Nap. G.</td>
<td>40</td>
<td>780</td>
<td>394</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>30-May-95</td>
<td>Nap. G.</td>
<td>44</td>
<td>1,000</td>
<td>792</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>30-May-95</td>
<td>Nap. G.</td>
<td>43</td>
<td>955</td>
<td>536</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>47.5</td>
<td>1,250</td>
<td>382</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>53.5</td>
<td>1,900</td>
<td>371</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>39.6</td>
<td>750</td>
<td>314</td>
</tr>
<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>30.5</td>
<td>330</td>
<td>306</td>
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<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>24</td>
<td>155</td>
<td>370</td>
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<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>23</td>
<td>135</td>
<td>326</td>
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<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>17.9</td>
<td>55</td>
<td>359</td>
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<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>13.8</td>
<td>30</td>
<td>343</td>
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<tr>
<td>Lates niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>10.5</td>
<td>9</td>
<td>293</td>
</tr>
<tr>
<td>Brycinus sp.</td>
<td>19-Oct-95</td>
<td>Bugaia</td>
<td>9</td>
<td>4</td>
<td>81.2</td>
</tr>
<tr>
<td>Rastrineobola argenteae</td>
<td>19-Oct-95</td>
<td>Bugaia</td>
<td>9</td>
<td>4</td>
<td>87.3</td>
</tr>
<tr>
<td>Haplochromine sp.</td>
<td>19-Oct-95</td>
<td>Bugaia</td>
<td>9</td>
<td>4</td>
<td>81</td>
</tr>
<tr>
<td>Oreochromis niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>35</td>
<td>1,155</td>
<td>34.6</td>
</tr>
<tr>
<td>Oreochromis niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>21.3</td>
<td>200</td>
<td>49.9</td>
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<tr>
<td>Oreochromis niloticus</td>
<td>19-Oct-95</td>
<td>Nap. G.</td>
<td>15.9</td>
<td>80</td>
<td>110</td>
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<tr>
<td>Caridina nilotica (0 m)</td>
<td>25-Oct-95</td>
<td>Nap. G.</td>
<td>87</td>
<td>87.3</td>
<td></td>
</tr>
<tr>
<td>Caridina nilotica (5 m)</td>
<td>26-Oct-95</td>
<td>Nap. G.</td>
<td>87</td>
<td>87.3</td>
<td></td>
</tr>
</tbody>
</table>
Mercury in Lake Victoria

producing or discharging pollutants. In 1992 Nriagu wrote a review of toxic metal pollution in Africa describing the increase in lead pollution from automobiles and cottage industries. Lead contamination in the water could also be indicative of an associated mercury problem. Globally, fossil fuel burning is the second largest anthropogenic source of mercury (22%) following final consumption of manufactured goods (60%) (Matheson 1979). Almost all of the mercury released from fossil fuels is emitted as vapor during the burning of those fuels. However, Lipiatou et al. (1996) measured polycyclic aromatic hydrocarbons (PAH) in an offshore core from Lake Victoria. The PAH concentrations increased to the surface of the core, likely a consequence of increased biomass burning as human population has increased. The dominant PAH were originating from low temperature combustion and wood burning.

While the levels of mercury of fish in Lake Victoria are currently within the acceptable limits for international markets (500 ng/g in Canada; 1,000 ng/g in the USA) it important to keep in mind that for many people living in the region, fish is the major source of animal protein. An individual living close to the lake is likely to consume more fish than is dictated by the U.S. Food and Drug Administration (FDA) which suggests limits of consumption for fish containing 500 ppb mercury. These limits are based on a weekly fish consumption rate of 400 g/person or a monthly limit of 400 g/person for infants and women of child-bearing age. FAO/WHO estimated a permissible tolerable weekly intake of MeHg of 3.3 µg Hg/kg/week; a 62 kg adult is permitted 19 µg Hg/day (Bernier et al. 1995). However, Rice (1995), using an estimate of daily fish consumption by Canadians of 20 g, suggested that a 62 kg woman should not consume more than 4 µg Hg/day. Using this daily estimate of 20 g/day the maximum allowable level in fish is 300 ng/g. Rice (1995) concluded that offspring of women consuming large quantities of fish (> 40 g fish/day) were at risk. The concentration of Hg in commercial fish in the North American Great Lakes, excluding Lake Michigan, was 140 to 320 ng/g (Bernier et al. 1995); similar to values found in the Nile perch of Lake Victoria. These levels of Hg concentration in fish muscle have triggered health advisories against high rates of consumption in the North American Great Lakes.

Mercury concentrations in the water column in Lake Victoria are higher than would be found in uncontaminated lakes and the concentrations in the solid phase of the sediments and the fish are comparable to those of the North American Great Lakes. It is important that riparian consumers of fish from Lake Victoria are educated about any potential hazards and the concentration of mercury in fish should be monitored.

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