Water Quality of central Cuban rivers; implications for the flux of material from land to sea

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As part of a Cuban/American academic exchange to assess mass transfer from land to sea, we collected water and sediment from 24 rivers (discharge at sampling, 0.002-40 m^3 s^{-1}) in central Cuba (2 to 730 km^2; mean, 14; median,56). Upstream land use ranged from 0 to 98% agricultural (mean, 56%) and 2 to 90% forested (mean, 42%). Observed turbidity was high. At each river, we measured conductivity (range 130-1380 uS/cm), dissolved oxygen (59-144% saturation), and pH (6.8-8.5). *E coli* were present in all samples; 14 of 24 rivers had MPN/100 mL above 171 indicating water unsafe for recreation and drinking. Total dissolved nitrogen was low and most of it was present as nitrate (ranging from 0.2 to 1 mg/L; mean, 0.4). Orthophosphate ranged from 0.1 to 0.6 ppm (mean, 0.24) and chloride ranged from 10-360 mg/L (mean, 103). Dissolved inorganic carbon was high and variable (14-96 mg/L, mean 51) and likely sourced from abundant carbonate bedrock. Variability in dissolved organic carbon was high (ranging from 1.8 up to 10 mg/L, mean 3.1).

The dissolved oxygen (both high and low values, indicating eutrophic conditions and high oxygen demand, respectively) suggest river quality is impacted by additions of organic material tied to human activities, most likely agriculture including grazing animals. *E. coli* data support this inference. Low concentrations of dissolved nitrate are consistent with conservative fertilization and little dissolved nutrient export. Our data suggest that suspended sediment, *E. coli*, and P could affect coastal ecosystems.