Title: **How Does Mercury Methylation Respond to Intensive Forest Management and the Creation of Anoxia in Floodplain Soils?**

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Mercury (Hg) is considered a global pollutant due to its long-range atmospheric transport and bioaccumulation in food webs. Forest ecosystems are thought to be sinks for Hg deposition through foliar uptake of dry elemental Hg(0). Hg can be transformed into a severe toxin when it can be converted to methylmercury (MeHg) when leaves are decomposed by the soil microbiome under anoxic conditions.

Efforts are underway in the southeastern US to convert as much as $2x10^6$ ha of stands of loblolly pine (*Pinus taeda*) to native longleaf pine (*Pinus palustris*). Intensive silvicultural practices will be used to facilitate conversion of the ecosystems. Those practices are known to temporarily alter the water balance of a site, but the effect of different silvicultural practices on Hg cycling and methylation in Southern pine watersheds is not well understood.

The aim of this two-year exploratory project is to characterize the influence of silvicultural practices on Hg cycling, especially Hg methylation. The work is being conducted within a first-order experimental watershed in on the Santee Experimental Forest in South Carolina. Tree harvesting (clear cutting) and thinning have been recently completed. We installed field transects from upland, riparian, to wetland with in-situ field sensors covering three portions of the experimental watershed - untreated (control), partial cutting (thinning), and complete tree removal (harvest). In addition to high frequency sampling of redox, water table depth, and soil temperature, we will conduct regular soil sampling along these transects through at least one year in order to characterize the changes of soil organic matter, total Hg (THg), and MeHg. We will also be sampling stream water and aquatic insects to characterize the movement of nutrients (i.e., C and N), THg and MeHg in the ecosystem.

The results should lead to the: 1) identification of biogeochemical “hotspots” of Hg methylation within Southern pine forest watersheds 2) relationships of silvicultural practices to MeHg production and accumulation in the food web; and 3) characteristics of organic matter that may be linked to the production of MeHg. The results, obtained by taking advantage of an experimental conversion of loblolly pine to a longleaf pine ecosystem, should be transferrable to understanding Hg biogeochemistry in other watersheds. Such an understanding may be useful in guiding forest managers on silvicultural practices that can mitigate or lessen Hg pollution. The findings from this study should also be useful in testing biogeochemical modelling of Hg dynamics.