



Atmospheric nitrogen deposition budget in a subtropical hydroelectric reservoir (Nam Theun II case study, Lao PDR)

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With 490 km² at full level of operation, Nam Theun 2 (NT2) is one of the largest hydro-reservoir in South East Asia. NT2 is a trans-basin hydropower project that diverts water from the Nam Theun river (a Mekong tributary) to the Xe Ban Fai river (another Mekong tributary). Atmospheric deposition is an important source of nitrogen (N), and it has been shown that excessive fluxes of N from the atmosphere has resulted in eutrophication of many coastal waters. A large fraction of atmospheric N input is in the form of inorganic N. This study presents an estimation of the atmospheric inorganic nitrogen budget into the NT2 hydroelectric reservoir based on a two-year monitoring (July 2010 to July 2012) including gas concentrations and precipitation. Dry deposition fluxes are calculated from monthly mean surface measurements of NH₃, HNO₃ and NO₂ concentrations (passive samplers) together with simulated deposition velocities, and wet deposition fluxes from NH₄⁺ and NO₃⁻ concentrations in single event rain samples (automated rain sampler). Annual rainfall amount was 2500 and 3160 mm for the two years. The average nitrogen deposition flux is estimated at 1.13 kgN.ha⁻¹.yr⁻¹ from dry processes and 5.52 kgN.ha⁻¹.yr⁻¹ from wet ones, i.e. an average annual total nitrogen flux of 6.6 kgN.ha⁻¹.yr⁻¹ deposited into the NT2 reservoir. The wet deposition contributes to 83% of the total N deposition. The nitrogen deposition budget has been also calculated over the rain tropical forest surrounding the reservoir. Due to higher dry deposition velocities above forested ecosystems, gaseous dry deposition flux is estimated at 4.0 kgN.ha⁻¹.yr⁻¹ leading to a total nitrogen deposition about 9.5 kgN.ha⁻¹.yr⁻¹. This result will be compared to nitrogen deposition in the African equatorial forested ecosystems in the framework of the IDAF program (IGAC-DEBITS-Africa).