



Carbon pathways in the Seine river system

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Many papers have recently suggested that the anthropogenic perturbations of the carbon cycle have led to a significant increase in carbon export from terrestrial ecosystems to inland waters. The quantification of the carbon cascade (including fate of CO₂ emissions) in highly anthropized river systems is thus essential to understand the response of aquatic systems.

The Seine Basin where Paris and its environs represent 2/3 of its population, and agriculture is particularly intensive, is a eutrophic system. The main aim of this research is to understand and quantify how an excess of anthropogenic nutrients entering the Seine River system may locally enhance primary production, C sequestration, C respiration and CO₂ emissions.

The development of a new CO₂ module in the pre-existing biogeochemical Riverstrahler model (Billen et al., 2007) should enable a refined calculation of the carbon budget. Besides calculation of the Respiration and Production activities along the entire river continuum, it will directly associate CO₂ emissions. The CO₂ modelling results will be confronted to (i) direct (in-situ) measurements with a non-dispersive infrared gas analyzer and (ii) indirect measurements based on total alkalinity, carbonate and pH along the Seine river system during the last decades, and (iii) calculations of a C metabolism budget.

Billen, G., Garnier, J., Némery, J., Sebilo, M., Sferratore, A., Barles, S., Benoit P., Benoit, M. (2007). A long-term view of nutrient transfers through the Seine river continuum. *Science of the Total Environment*, 375(1-3), 80–97. <http://doi.org/10.1016/j.scitotenv.2006.12.005>