# Do stable isotopes can help to better understand the effect of agroecosystems on their inter-connected ecosystems: a case study of fishpond dams effect on temporary streams?

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**Abstract**

Fishpond dams as extensively manage agroecosystems can strongly affect temporary low-order stream functioning, especially through changes in water quality and loss of ecological continuity. In addition, the presence of these lentic agroecosystems promotes the production of autochthonous organic matter, changing the trophic resources in the receiving streams. Yet, the consequences of these changes on communities and stream functioning remain largely understudied. We investigated the effects of these agroecosystems on the trophic ecology of macroinvertebrate assemblages in temporary low-order streams using C and N stable isotopes. Available food resources and macroinvertebrates were sampled in one upstream- and one downstream site of two temporary low-order streams, one with a fishpond (impacted stream) and another without fishpond (reference stream). Macroinvertebrate assemblages and densities, as well as stable isotope composition of food resources and dominant macroinvertebrate taxa were measured. Functional diversity indexes were calculated to detect and quantify differences in invertebrate trophic niches. Bayesian stable-isotope mixing models were used to investigate the differences in food sources assimilated by macroinvertebrate communities. Upstream site of the impacted stream and both reference sites showed similar invertebrate assemblages and isotopic compositions suggesting moderate effects of fishponds on the upstream tributaries. In contrast, at the downstream site of the impacted stream, we recorded ten times higher invertebrate biomasses. Modifications in the invertebrate trophic niches and food sources assimilation were also evidenced. Isotope analyses and invertebrates

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assemblages allow us to identify that by modifying the food sources fishpond dams tend to alter invertebrate assemblages but also shift the trophic dynamics downstream the fishpond. This assessment underlines the usefulness of these tools to explore interactions between adjacent and/or interconnected (agro) ecosystems.