

Watershed studies in a region mainly occupied by small holder farms in the eastern Amazon

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In three small watersheds of the Cumaru, São João and Timboteua streams (3600, 2300, and 6800 hectares, respectively) close to Igarapé-Açu, Pará, in the eastern Amazon, several studies have been conducted at different spatial scales. In this region, mainly occupied by small-holder farms (less than 50 ha), slash-and-burn agriculture is the dominant economic activity, with many young secondary forests as temporary fallow phases within the agricultural cycle. These small agricultural fields and fallows, along with small pastures, cover most of the landscape. Previous studies have shown the positive biogeochemical and hydrological aspects of alternative fallow vegetation management by chop-and-mulching instead of slash-and-burning. This result motivated our research team to detail and expand agriculture watershed studies, measuring water chemistry across hydrological cycles of different land uses, as well as simulating pesticide contamination and characterizing fish species assemblies. Our more important findings include: 1- Although showing a negative correlation, partial pressures of dioxide carbon and dissolved organic carbon concentrations in stream water were higher than in some other Amazonian catchments; 2- Low stream water pH indicates that cation inputs have been not enough to buffer the effects of organic compounds from riparian and secondary forests that enter into stream water; 3- Nutrient loads in runoff are smaller from mulched agriculture fields than from burned fields, reducing nutrients and sediments entering into streams; 4- Shallow water table together with soil and geological characteristics increase the risk of contamination of groundwater by pesticides used in small farms; 5- A high fish species diversity, with 43 species of 12 families, is more expressive downstream than in upstream headwater areas. Finally, this ongoing research is part of an interdisciplinary effort to understand agriculture watersheds within the scope of Amazonian small farming, endeavoring to support river basin management and sustainable development planning in the eastern Amazon.

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