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Assessing pesticide exposure of the aquatic environment in tropical catchments

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Today, pesticides are intensively used in agriculture across the globe. Worldwide about 2.4×10^6 tons of pesticides are used annually on 1.6×10^9 ha of arable land. This yields a global average use of pesticides of 1.53 kg ha^{-1} year^{-1}. Available data suggest that the use in the agricultural sector will continue to grow. Recently it was estimated that within the last decade, the world pesticide market increased by 93% and the Brazilian market alone by 190%. Though pesticides are intensively used in many low and middle income countries (LAMICs), scientifically sound data of amounts and types of pesticide use and the resulting impact on water quality are lacking in many of these countries. Therefore it is highly relevant to: i) identify risk areas where pesticides affect environmental health, ii) understand the environmental behavior of pesticides in vulnerable tropical ecosystems; and iii) develop possible mitigation options to reduce their exposure to ecosystems and humans.
Here we present a project that will focus on assessing pesticide exposure of the aquatic environment and humans in tropical catchments of LAMICs. A catchment in the Zarcero province in Costa Rica will be the test case. Pesticide exposure will be assessed by passive sampling. In order to cover a broad range of compounds of possible use, two sampling devices will be used: SDB membranes for collecting polar compounds and silicon sheets for accumulating apolar pesticides. Extracts will be subsequently analysed by GC-MSMS and LC-HRMS.