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# What interactions between ecosystem services linked to soil functioning?

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## Abstract

Agricultural ecosystems contribute significantly to water flow in hydrosystems, but are also important water consumers. This situation reveals possible trade-offs risk among green and blue water regulation services, especially areas affected by water deficit. The main objective of this work is to analyze and quantify interactions (trade-offs or synergies) between different ecosystem services provided to farmers and society. Analysis focus in particular on the interactions between green water, blue water, soil quality, and climate regulation. This question is addressed at two spatial scales: at French national scale and in two areas where water management is a priority (Beauce groundwater and Adour-Garonne hydrographic basin); and is addressed at three temporal scales: the cultural season, the year, and a three decades period. Taking into account the spatial and temporal dimension of interactions between services make possible to assess the response time of agro-ecosystem change, and to evaluate the temporal dynamics of synergies or trade-offs between services. To do this, this work is based on conceptual and methodological frameworks and on the important modelling and simulation device (using the STICS crop model) developed as part of the INRA (French National Institute for Agricultural Research) EFESE-EA study. Ultimately, this work aims at understanding and modelling agro-ecosystems functioning at different spatial and temporal scales, and to quantify, map, and evaluate the services provided.

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