



A framework for designing socially and ecologically acceptable innovative scenarios of evolution of farming systems by combining integrated agro-hydrological modelling and a participatory approach

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Water resources are severely affected in intensively managed agricultural catchments, especially due to the increase in fluxes of nitrogen towards ground and surface water bodies, inducing eutrophication and sanitary issues. Following the growing awareness of this issue, a large variety of integrated agro-hydrological models have been developed in the past decade, primarily for a heuristic purpose, displaying a large variability regarding their rationale, i.e. the way biophysical processes are accounted for (or not) or their spatial resolution. Several of these models have been used for operational purpose, as decision support tools for testing innovative scenarios of agricultural changes. In such cases, several experiences show that if the stakeholder rarely cast doubt on the validity of the model rationale, they often call into question the way scenarios are translated into model inputs regarding agricultural practices and their techno-economic relevance. This is especially the case when the scenarios include deep evolutions of breeding systems, where the question of securing the herd feeding becomes crucial. Few experiences of coupling farm models with agro-hydrological model constitute a significant improvement in the objective of simulating realistic and acceptable scenarios.

A framework is developed within a pluridisciplinary research project, in a coastal agricultural catchment affected by macro algal eutrophication, relying on the use of an agro-hydrological model coupled with a farm model. The originality of this framework is that it combines the use of the model with a participatory approach of scenario building with farmers embarked on an evolution of their systems. The protocol involves 3 iterative steps, and the final objective is to provide a decision support for water policy design at the catchment scale. The first results will be presented together with a discussion on the limits that have to be given to integrated modeling and on the interest of this alternative way of handling model uncertainty by sharing model limits with stakeholders in a participatory process.

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