Ecow

Ecological theories and Control methods for the Optimization of West african agroecosystems

ABSTRACT

The sustainability of agroecosystems, along with the ecological services they provide, is a major stake for present and future agronomy. In the context of global change, it is urgent to revisit the paradigms of agronomy, to come up with a new sustainable agriculture with high productivity and low energy and fertilizer consumption.
In west African agro-sylvo-pastoral agroecosystems where there are low inputs of nutrients, fallow and livestock managements are key agricultural practices that influence both nutrient retention within the agroecosystem, and nutrient fluxes between spatial components of the agroecosystems. Therefore, these practices might be key levers to optimize crop/meat productivity.

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Project leader : Tanguy Daufresne
Project leader's institution : INRA-INRAE
Project leader's RU : ECO&SOLS MISTEA

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Total budget allocated (including co-financing) : 20000 €
Funding : Labex

GOAL

At the crossroad between Agronomy, Ecology, Mathematical modelling and Control theory, the ECOW project aims at identifying the optimal configurations and control strategies of agroecosystems for the optimization of crop/meat production in a sustainable way. We propose an innovative approach based on the use of concepts from ecology such as meta-ecosystem and compartments model, and on mathematical methods of the control theory.

ACTION

The project will be organized in 3 steps:
Analysis, sensitivity analysis, and calibration of the biogeochemical fluxes and stocks model developed by Anne Bisson to represent a typical west-African agroecosystem
Optimization of crop/meat production through the spatial and temporal organization of the agroecosystem (“organizational practices”)
Optimization of crop/meat production through the adaptation of “interconnection practices” (nutrient fluxes due to livestock, the fluxes of fertilizers, the harvest and exportation of crops).

RESULTS

The project ECOW should provide interesting outcomes to share with stakeholders. It will help understand of how agricultural practices influence crop/meat production in west African agro-sylvo-pastoral agroecosystems , and will permit to identify configurations of practices that optimize productivity.