

# API-SMAL 2016-2019

Agroecology and policy instruments for sustainable  
multifunctional agricultural landscapes

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# PROJECT CONTEXT

## Sustainable Agriculture: Dealing with several challenges

- ..Feeding the cities (and the world !) requires increasing production
- ..Reducing impacts on the environment and health requires diminishing inputs
- ..Contributing to global challenges (climate change, biodiversity conservation)

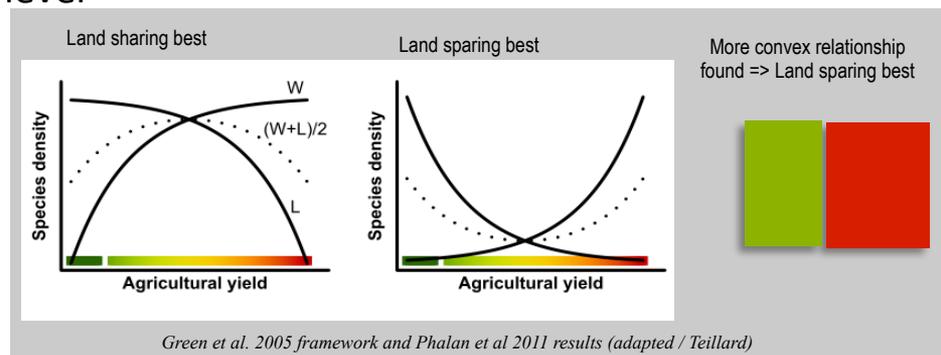
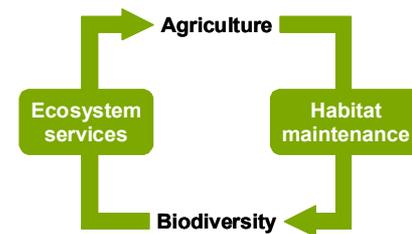
=> **Conflicting issues and trade-offs**

## Move toward agroecological agriculture (Bommarco et al. 2013; Kremen 2015)

- ..Favor biodiversity-based ecosystem services, some of which are essential to agricultural production (soil fertility, nitrogen fixation, erosion control, pollination, pest and disease control...)
- ..Based on ecological dynamics at the landscape level

***..Solutions for each issue call for particular landscape compositions and spatial patterns.***

E.g., the Land sparing / Land sharing debate



Need to **design multifunctional landscapes and mechanisms to implement them**

# PROJECT OBJECTIVES

## Objectives:

Examine how *agroecological solutions* can reconcile economic, ecological and environmental performances in agricultural landscapes

- Determine the spatial patterns of agricultural land use and practices providing agroecological solutions to a variety of issues
- Identify the match and mismatch of these solutions at different scales to exhibit the synergies and antagonisms between BBES
- Identify policy instruments for sustainable multifunctional landscapes

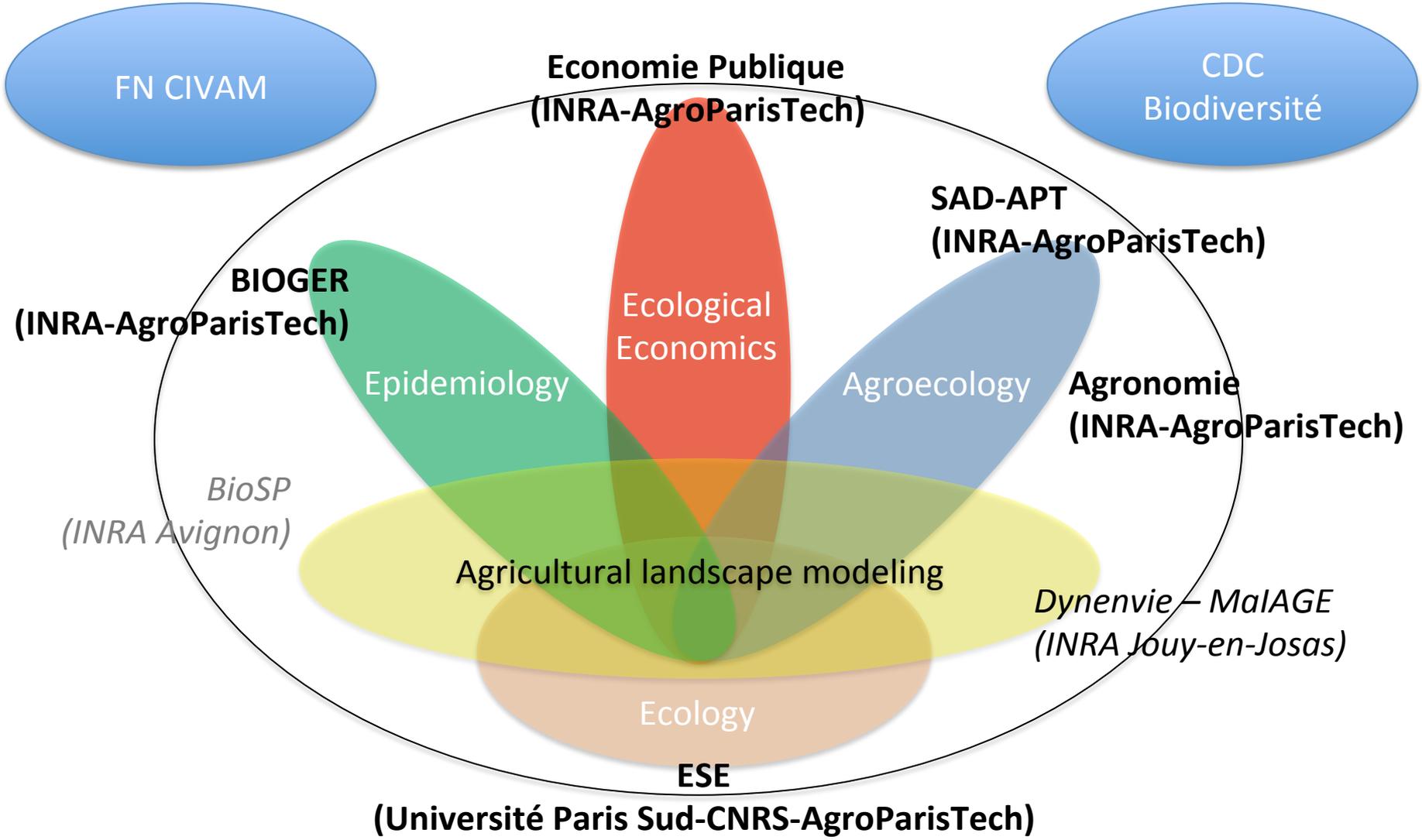
## Research questions:

(Q1) How do land use and practices affect agricultural production, biodiversity and ecosystem services?

(Q2) What are effective spatial patterns of agricultural land use to reconcile agricultural production, biodiversity and ecosystem services?

(Q3) How can market mechanisms and policy innovative instruments be combined to reach sustainable land use strategies?

# CONSORTIUM



## TOOLS, METHODS & SCALES

### Multi-scale, multi-issues interdisciplinary approach

- . Multiple spatially explicit dynamic models
  - . Simulation / multicriteria optimization of different management options within field (intensity, varieties, practices) and their spatial arrangement within landscapes
- . Multi-scale (field, landscape, region)

### Trade-off analysis

- . Identification of the drivers of the supply of BBES at multiple scales
- . Design of multi-objective / multi-scale incentive mechanisms to implement target landscapes (public policies, market-based approaches...)

Policy-makers involvement for designing management scenarios to be assessed with the models

## WORKING PROGRAM (1/3)

**Overall goal:** Study and design agroecological solutions

(a set of agroecological practices, at field, farm or landscape level, designed to improve the performance of the landscape with respect to one or several challenges)

Five challenges:

- Crop protection from (1) diseases and (2) insects
- (3) Environmental externalities reduction (soil erosion, water pollution, GHG emissions)
- Biodiversity and ecosystems preservation: (4) farmland bird conservation and (5) Biodiversity-Based Ecosystem Services (BBES) and co-evolution

Models for each challenge => need for consistency-check / integration

## WORKING PROGRAM (2/3)

Working program divided in four tasks, involving all partners.

### **Task 1: Characterizing and assessing agroecological solutions for sustainability challenges in agricultural landscapes**

T1.1: Identifying potential agroecological solutions

T1.2: Assessing the performance of agroecological solutions at different scales

T1.3: Construction of a common formalism to describe agroecological solutions and scenarios

### **Task 2: Identifying match and mismatch between agroecological solutions at multiple scales**

T2.1: Inventory of agroecological solutions and their effects on the different challenges

T2.2: Identifying match and mismatch of agroecological solutions at different scales

T2.3: A framework supporting trade-off/synergy analysis across scales

## WORKING PROGRAM (3/3)

### **Task 3: Exploring synergies and antagonisms among challenges at different scales**

T3.1: Assessment of the performances of agroecological scenarios over all challenges

T3.2: Quantifying the synergies and antagonisms among agricultural challenges at landscape scale

T3.3: Determining efficient multi-scale agroecological solutions

### **Task 4: Design and assessment of sustainable agricultural landscape management strategies**

T4.1: Stakeholder-scientist dialogue group

T4.2: Design and economic analysis of public policies to implement agroecological solutions

## NON-ACADEMIC PARTNERSHIP

**CDC – Biodiversité** will participate to the actor-science dialogue implemented in Tasks 4 on inventory of new instruments and scenarios for ecosystem service and biodiversity. we aim at studying policy design and the way large-scale incentive programs could be set (in particular, Payment for Environmental Services) to achieve sustainable agricultural landscapes through agroecological solutions. The innovative financial instruments that are currently developed by CDC – Biodiversité will be scrutinized in the project.

**FNCIVAM** members will contribute to the inventory of agroecological solutions and to the design of agroecological scenarios through the workshops organized in Tasks 4. Moreover, we are interested in studying the current development of GIEE (Groupements d'Intérêt Economique et Environnemental) and their role as bottom up instruments for the implementation of landscape-scale agroecological solutions. FNCIVAM will help us to select interesting GIEE from the list of labelled groups (<http://agriculture.gouv.fr/les-groupements-dinteret-economique-et-environnemental-giee>), to participate in Task 4.

# Planning

- Task 1 started, building on each partner's own works
- Partnership conventions with non-academic partners
  - Accord-cadre INRA – FNCIVAM
  - Specific convention with CDC-Biodiversité
- Task leaders meeting in December 2016 to start interdisciplinary work
- Kick-off meeting with all participants scheduled in January 2017

## Conclusion: The role of BASC

- The project builds on the dynamics of the previous Project flagship 3  
“Promouvoir et gérer la biodiversité pour des systèmes socio-écologiques durables.”
- The discussions around the project took place within the Basc community.
- The project would not have been set up without the BASC call.