

## Agro-ecosystems as ecological funds: a condition for innovative design?

Elsa Berthet, Blanche Segrestin, Benoit Weil

► **To cite this version:**

Elsa Berthet, Blanche Segrestin, Benoit Weil. Agro-ecosystems as ecological funds: a condition for innovative design?. 8. SIG Design Theory Paris Workshop, Special Interest Group of the Design Society., Jan 2015, Paris, France. 11 p. hal-02795542

**HAL Id: hal-02795542**

**<https://hal.inrae.fr/hal-02795542>**

Submitted on 5 Jun 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



# Agro-ecosystems as ecological funds: a condition for innovative design?

Elsa Berthet<sup>1,2</sup>, Blanche Segrestin<sup>2</sup> and Benoit Weil<sup>2</sup>

<sup>1</sup>UMR SADAPT, INRA

<sup>2</sup>CGS, Mines parisTech

8<sup>th</sup> International Workshop on DESIGN THEORY  
Special Interest Group of the Design Society  
26-27 January 2015

# Introduction

- Increasing challenges in environmental issues: new distributed but “common” objects
    - Ex.: smart cities, sustainable agricultural systems...
  - Strong design challenges:
    - Stakeholders with diverging interests
    - Multifunctional and multidimensional objects
    - High uncertainty and unknown
- ⇒ A need for methods and tools to better qualify the objects of design and initiate their collective design process

- Agro-ecosystems: emblematic of these design challenges
- However, in the literature, their design is a blind spot
  - Economy:
    - Damages on ecosystems = externalities
    - Ecosystems = stocks of natural capital
  - Ecology:
    - Ecosystems are given (modeling approaches)
    - Human activities disrupt their functioning
  - Agronomy:
    - Ecosystems = “context” of agricultural production
    - Avoiding hazards through “artificialization”

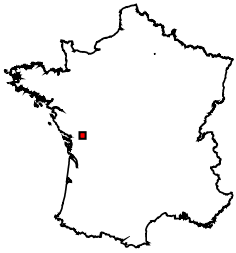
Costanza & Daly  
1992

Blandin 2009

Meynard & Girardin  
1991

# Toward a model for agro-ecosystem design

## ... building on an empirical case

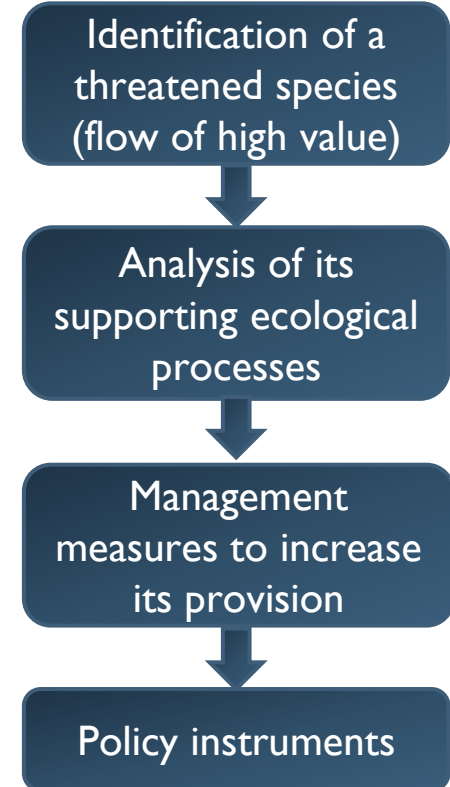


- ▶ Case study in the West of France
- ▶ Intensive cereal plain
- ▶ Biodiversity and water quality degradation



- ▶ Initial situation: a conflict about « known » values

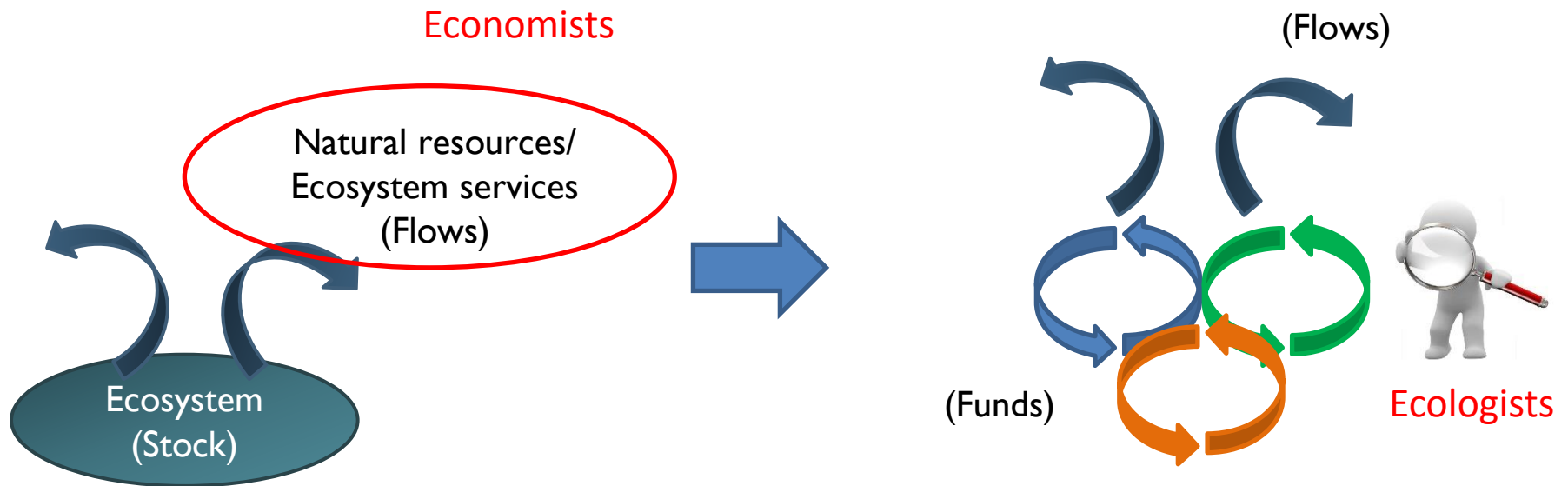
Initial approach  
(*Ecologists, naturalists, local authorities*)



Problems: public spending, conflicts...

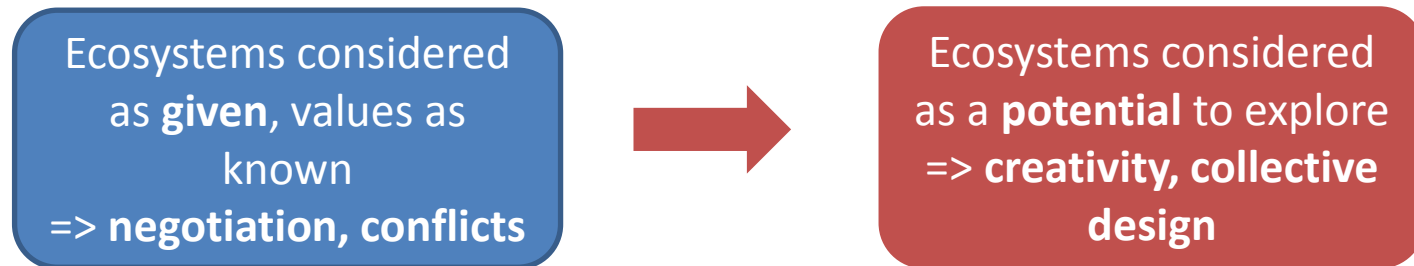
# Toward a model for agro-ecosystem design

- Proposition 1: Ecosystems are not stocks, but funds



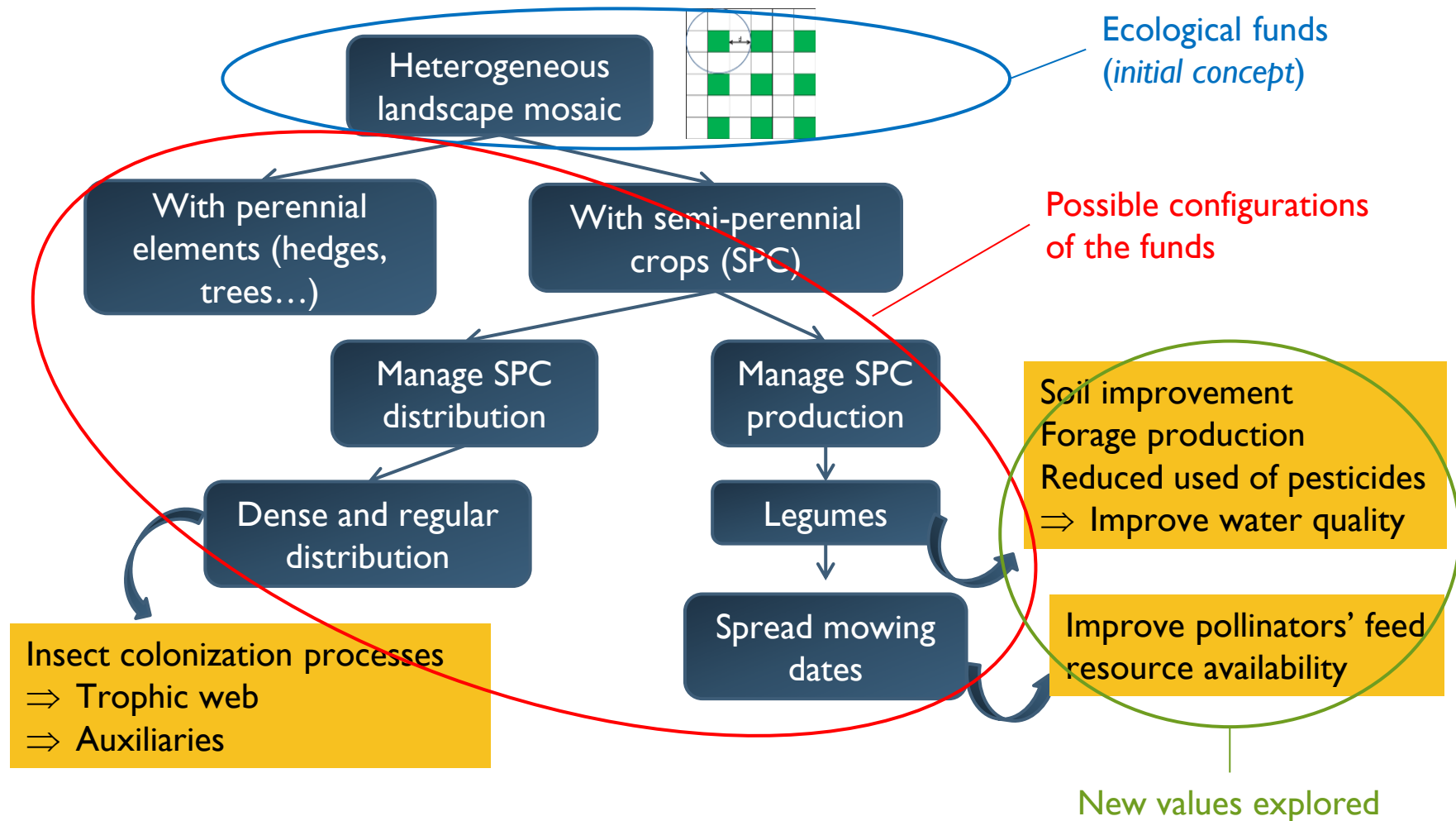
- A need to identify key regulations  
⇒ knowledge in ecology
- Ex. "Landscape"

- Proposition 2: Ecosystems can be designed
- Are all flows known?
- A change of perspective



- Ecological funds: departure point of a design process
  - Ecological core regulations as basic rules for design
  - Exploration of various configurations and potential values of these funds

# Exploring the potential of the ecological funds





# Ecological funds and the management of innovation

- Identification of key regulations
  - ⇒ Initial design **specifications**
- Not a common good, but a **common unknown**
  - Funds are open-ended
  - A variety of stakeholders may be involved in their design to ensure acceptability

# Ecological funds and technological platforms

	<b>Ecological funds</b>	<b>Technological platforms</b>
<b>Structure</b>	A fund as a common unknown	A core and a periphery (modules)
<b>Context</b>	Conflicts and innovation deadlock	Competition by innovation
<b>Leader</b>	No leader	Leader firm
<b>Aims</b>	<ul style="list-style-type: none"> <li>- Initiate innovative design for a sustainable management of AES</li> <li>- Involve and coordinate stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>- Control value creation</li> <li>- Stimulate innovation of complementors</li> <li>- Address uncertainty</li> </ul>
<b>Principle</b>	<ul style="list-style-type: none"> <li>- Identify key ecological regulations</li> <li>- Then consider funds as open-ended (New properties)</li> </ul>	<ul style="list-style-type: none"> <li>- Define design standards</li> <li>- Generate new uses/applications</li> </ul>
<b>Role in a design process</b>	<ul style="list-style-type: none"> <li>- Initial specifications</li> <li>- Make visible interdependences between stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>- Initial specifications</li> <li>- Facilitate complementation</li> <li>- Generate interdependencies</li> </ul>

## Implication for design theories

- Ecology: From a modeling science to a design science
  - ⇒ How to support this shift?
  - ⇒ From « scientific concepts » to « concepts for design »
    - Ex.: landscape
- Identifying « funds » for design issues in other contexts: e.g. sustainable cities
  - Key regulations as « grips » for design
  - Orientation of collective learning
  - Identify a common unknown to involve stakeholders in conflict

# Thank you for your attention



[elsa.berthet@agroparistech.fr](mailto:elsa.berthet@agroparistech.fr)