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

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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”

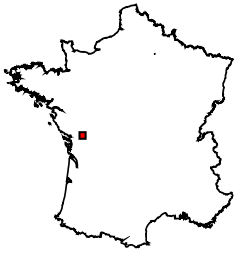
Costanza & Daly
1992

Blandin 2009

Meynard & Girardin
1991

Toward a model for agro-ecosystem design

... building on an empirical case

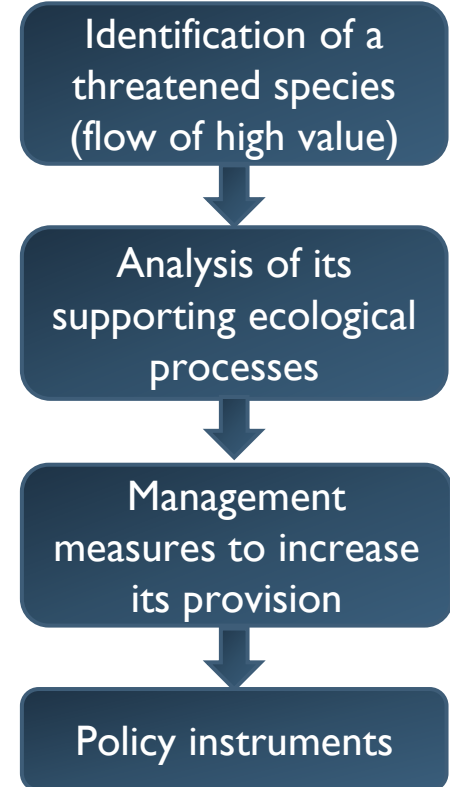


- ▶ Case study in the West of France
- ▶ Intensive cereal plain
- ▶ Biodiversity and water quality degradation



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

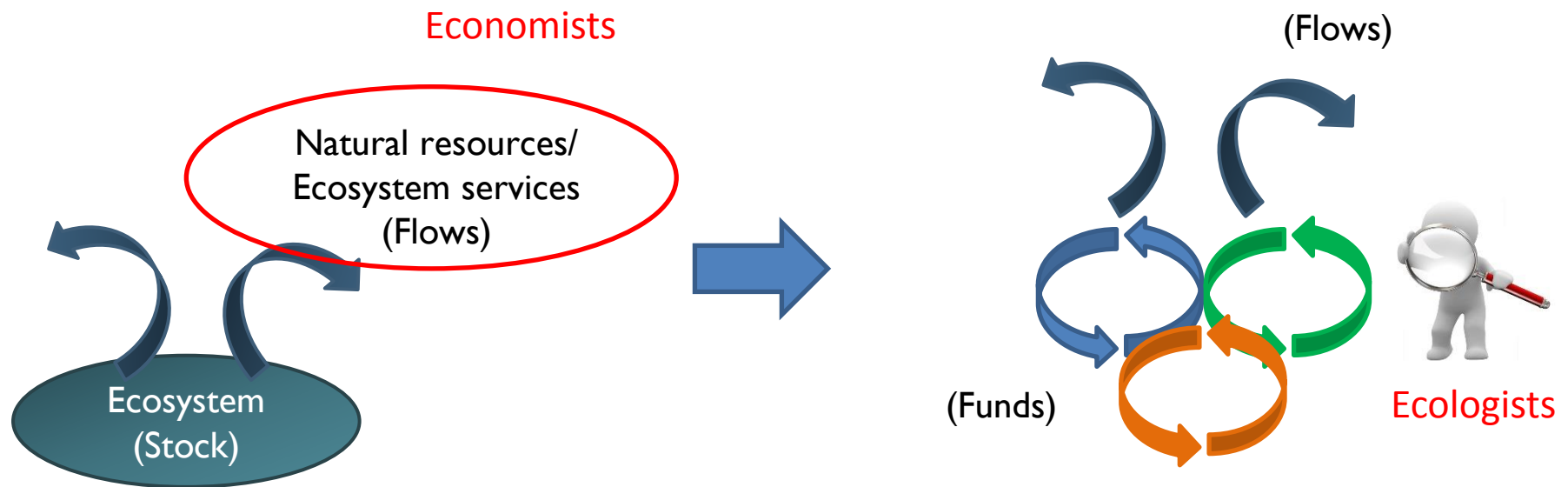
Initial approach
(*Ecologists, naturalists, local authorities*)



Problems: public spending, conflicts...

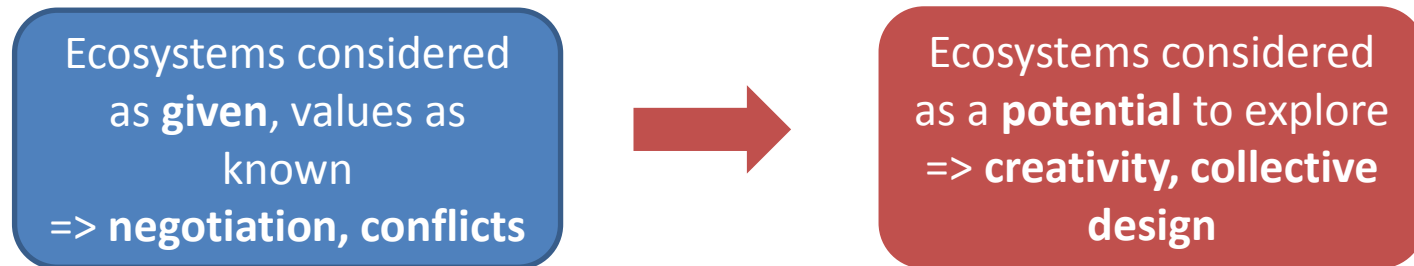
Toward a model for agro-ecosystem design

- Proposition 1: Ecosystems are not stocks, but funds



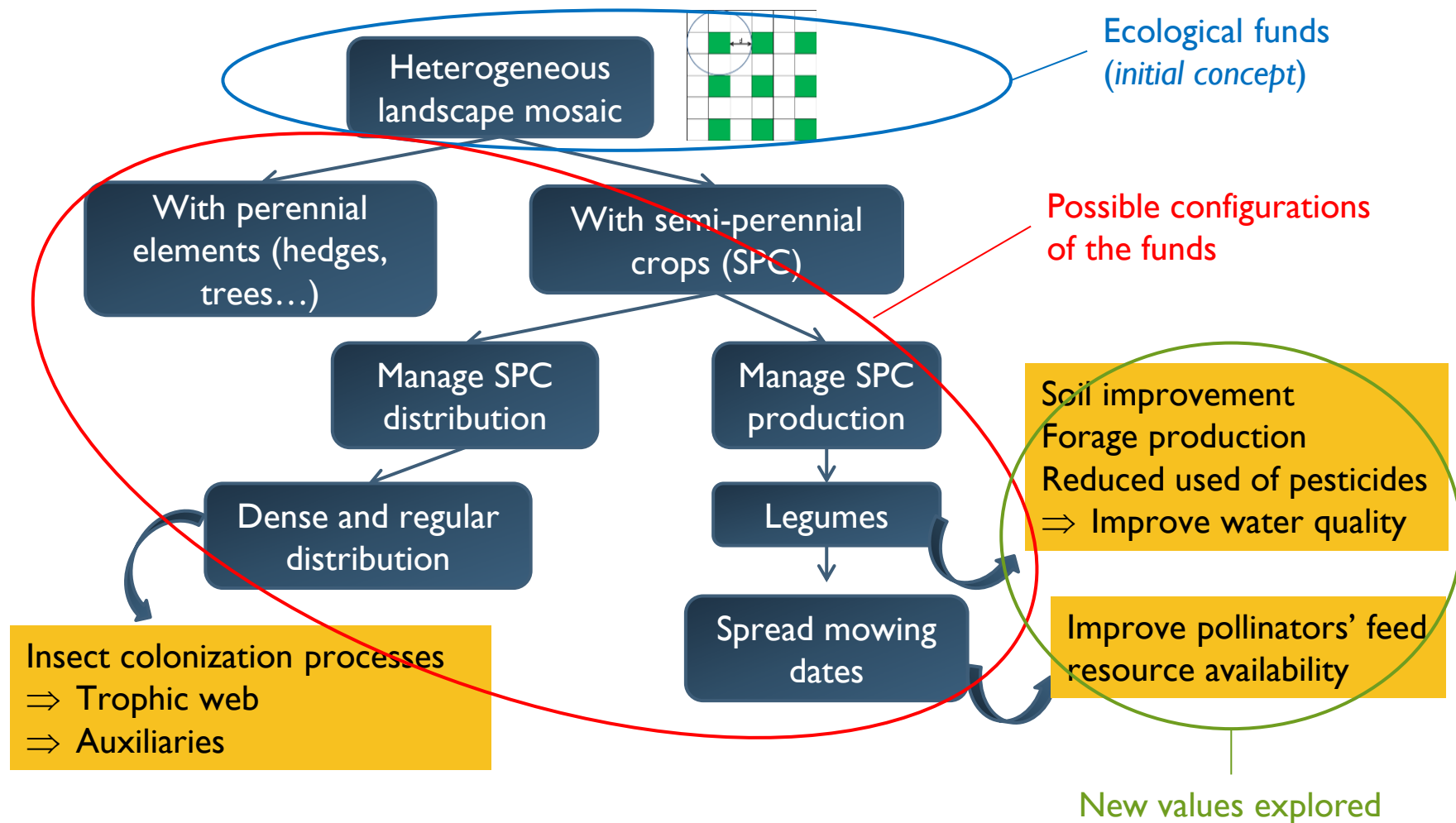
- A need to identify key regulations
⇒ knowledge in ecology
- Ex. "Landscape"

- 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

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

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



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