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Innovative design of agricultural systems

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Innovative design of agricultural systems :

1. The need for innovative design

1.1. What is innovative design?

1.2. Innovative design, at the heart of many tensions

2.The pathways to innovative design

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✓**Researchers in management operate a distinction between two design systems (Le Masson, Weil, Hatchuel, 2006):**

✓ **<u>Rule-based design:</u>**

- ✓**The design goals are clearly defined in advance : gradual modifications to products or existing technologies.**
- ✓**Skills and validation processes are unchanged from one innovation to another.**

✓**<u>Innovative design:</u>**

- ✓**The design frame is called into question**
- ✓**The goals take shape during the design**
- ✓**Il is not possible in advance to specify the required skills and the validation methods**

- **The improvement of agricultural systems clearly calls for a considerable effort of innovative design**
  - **Improvement of ecosystem services**
  - **Adaptation to climate change**
  - **Integration of territorial dynamics**
  - **Design of agri-food systems**
  - **…**

- **Innovative design and the organisation of agronomic research**
  - **The classic project-based financing of research seems to be an obstacle to innovative design.**
  - **The design activity must at least partially direct the acquisition of knowledge.**

- **Innovative design, at the heart of many tensions**
  - **The classic tension between economic and environmental requirements**
  - **The tension between individual farmer's decisions and territorial dynamics**
  - **The tension between sectors of a same territory, associated with competition between different productions for territorial resources**

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Resolving tensions will suppose compromises; the solution of contradictions, insoluble at a given scale, will have to be sought at other scales;

- **There is no question of looking for an illusory consensus on the types of desirable innovations or ideal farming systems.**

- **We propose to consider that the priorities are:**
  - **To prepare a diversity of solutions, to leave the choice to farmers and other stakeholders;**
  - **To help the farmers and other stakeholders to built their own systems, adapted to their own situation and to built their own compromises.**

Innovative design of agricultural systems :

1. The need for innovative design

2.The pathways to innovative design

2.1. supporting farmers to design systems adapted to their situation

2.2. suporting territorial stakeholders to interact around ressource management

2.3. identifying the levers for action of public authorities

- **2.1. Supporting <u>farmers to design systems adapted to their situation</u>**

- **Two major sets of approaches:**

  - **Designing cropping and farming systems that break away from existing ones. Very often "model- based design"**

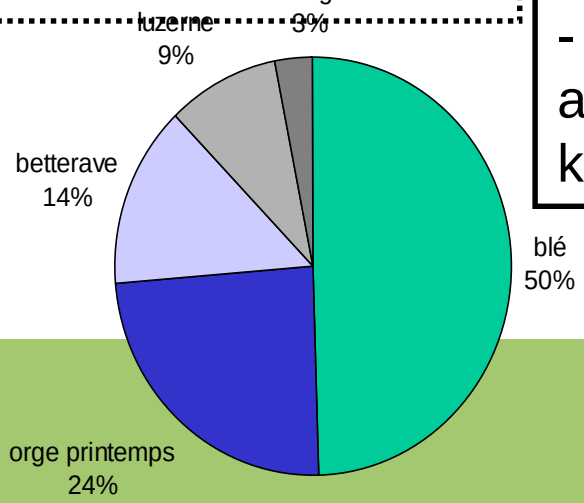
  - **Improving the existing systems step by step. diagnosis / evolutions of the systems are imagined, and implemented / new diagnosis … Spiral of continuous improvement.**

Example of step by step design on a pilot farm in Picardie

(réseau de 8 fermes Programme Protection Intégrée, P. Mischler et al).

2002 : Agronomical and environmental diagnosis

- TFI : 8.08
- 5 crop species
- wheat / wheat : 16%



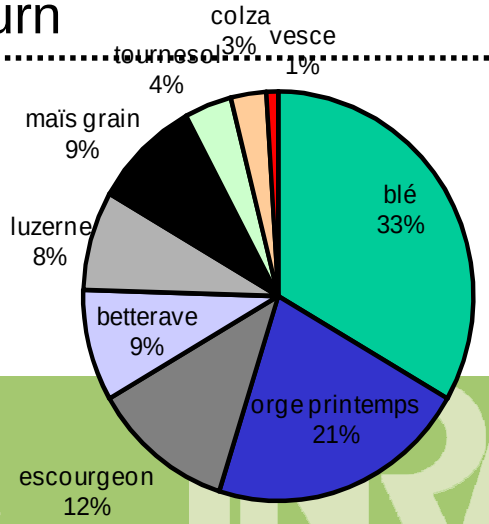
Change in practices

- Spiral of continuous improvement
- Crop diversification, new crop management
- mobilisation of a « Library of innovations »
- combination of local and scientific knowledges

2008 Agronomical and environmental diagnosis

- TFI : 3.65
- 9 crop species
- wheat / wheat : 0%

No change in economic return



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2.2. Supporting territorial stakeholders to interact around ressource management

- **How can innovations relating to the coordination of farming systems at territory level be helped?**

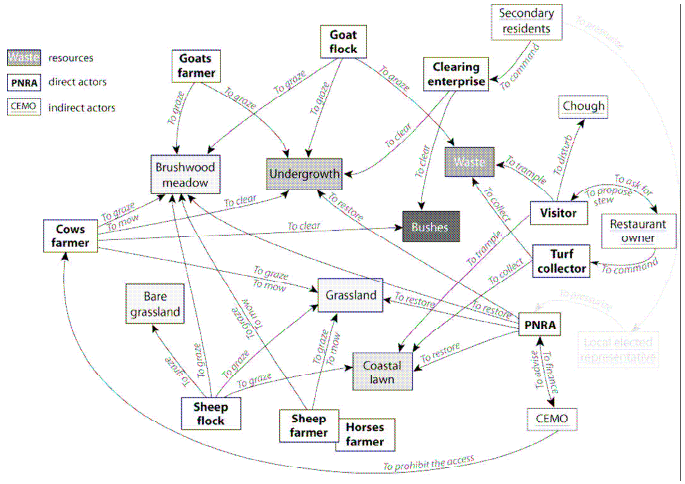
- **The interests of the various stakeholders can be contradictory, their representations of the situation irreconcilable, or their information asymmetrical.**

- **Such questions are a special area of participatory research. particularly favourable to collective learning processes.**

Example of companion modelling, focused on the relations between livestock farming, tourism and biodiversity on Ouessant island of Brittany (Groupe ComMod, M. Etienne et al).

Companion modelling is based on a 3 step approach

- **Eliciting a common representation of the territorial processes to be steered jointly;**
- **Acting in situation, with a role-playing game, to experience this complexity from inside.**
- **Visioning adaptive management options**



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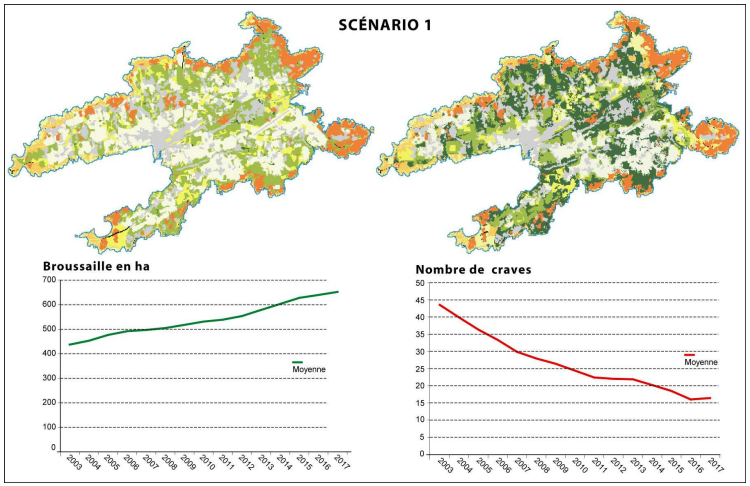

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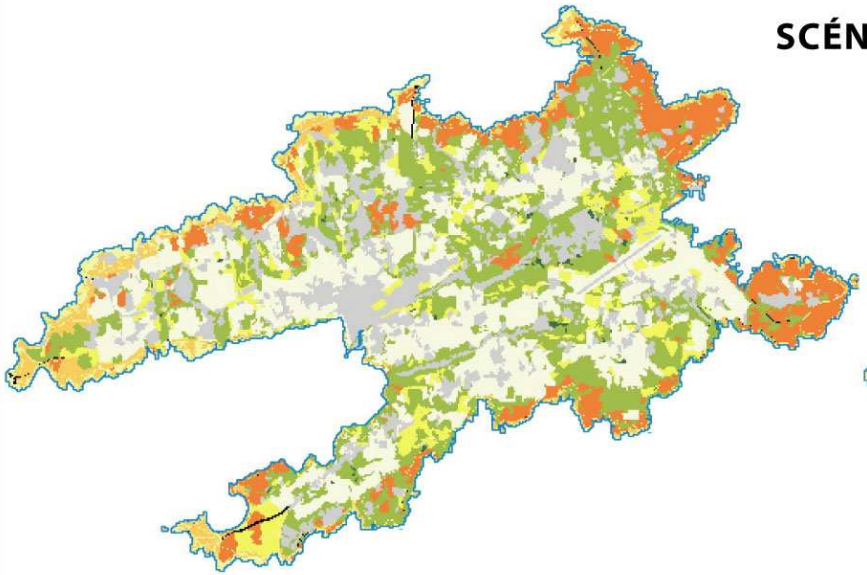

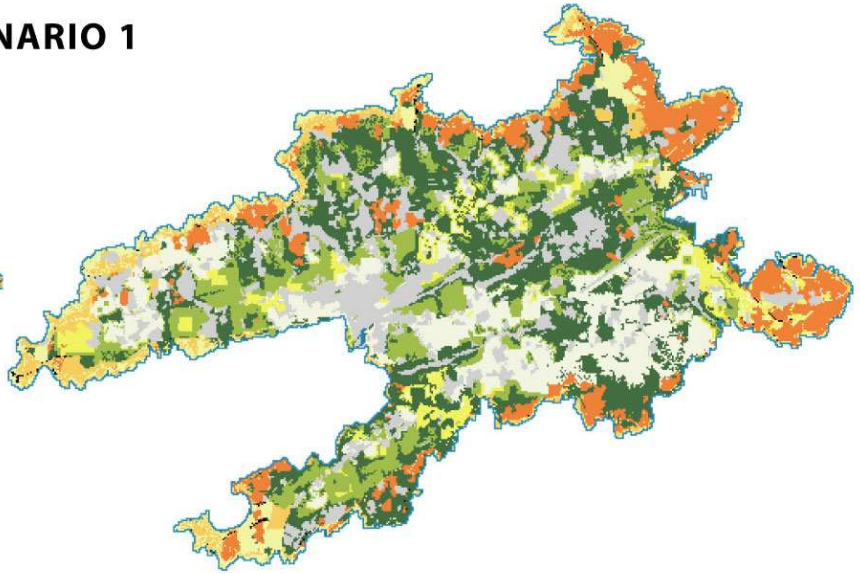

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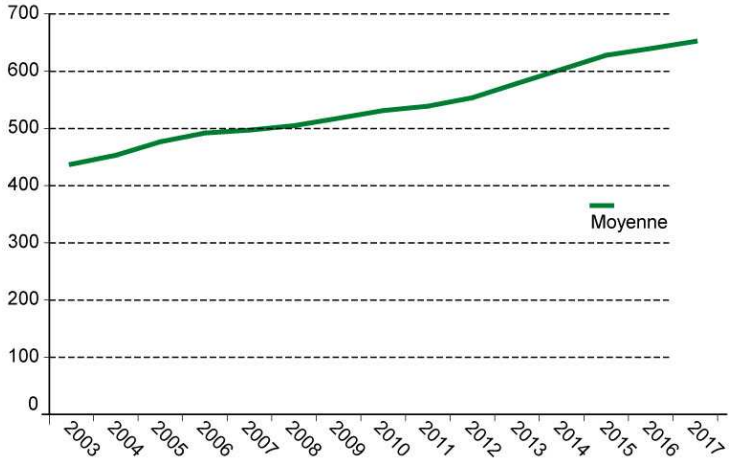
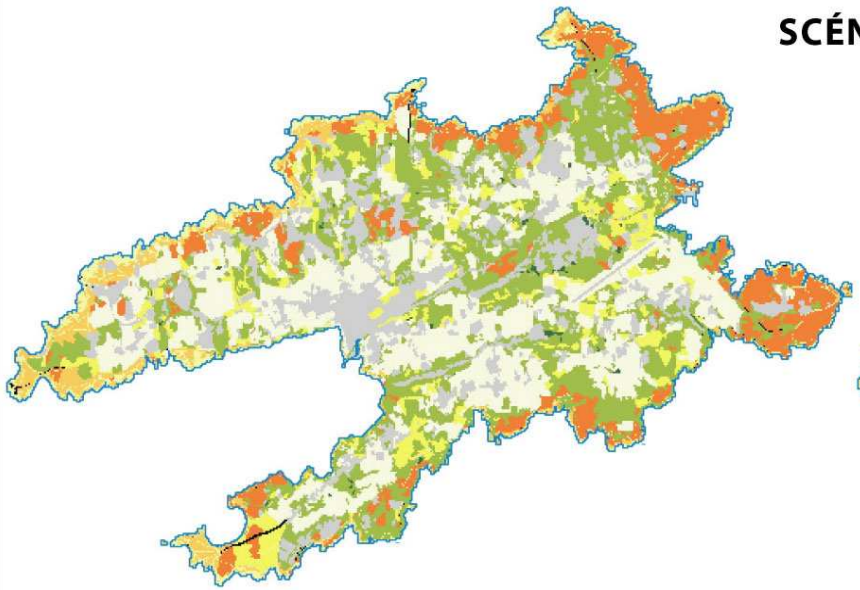
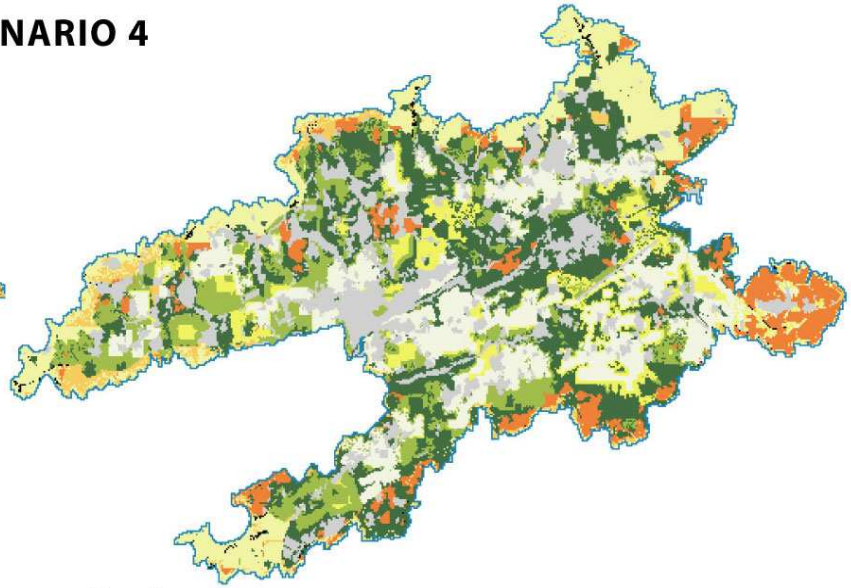


Nombre de craves

SCÉNARIO 4





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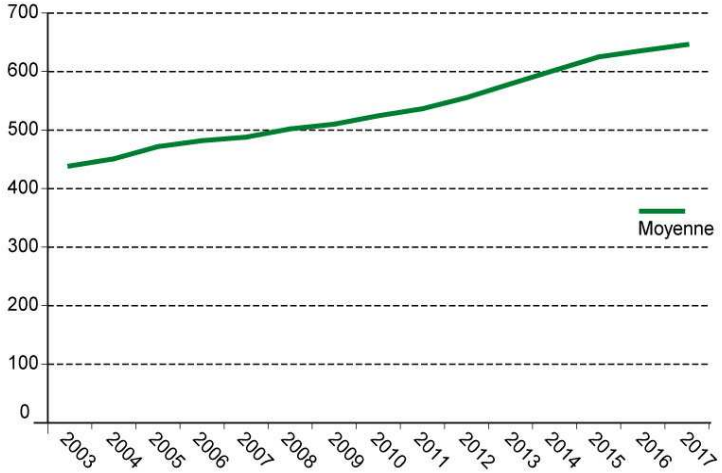

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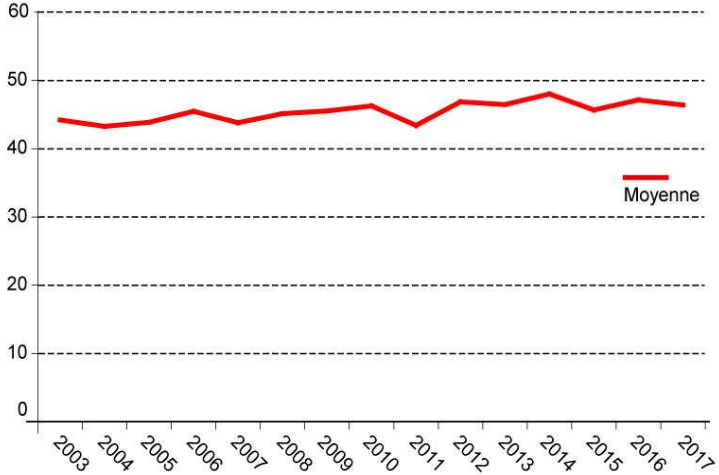

3.3. Identifying the levers for action of public authorities

For an agronomist, the standardisation of "good agricultural practices" is a nonsense:

- ✓**they sometimes strongly limit the capacity of farmers to adapt to the diversity of soils, climates and situations,**

- ✓**they are codified at the elementary agricultural technique level whereas environmental impacts often depend on interactions between several techniques;**

- ✓**they are often felt to be constraints: protection of the environment thus loses value in the farmers' opinions**

Agri-Environmental measures aimed at safeguarding diversity in grasslands.

- Before 2007, obligation of means : complex, restrictive and badly received by farmers.

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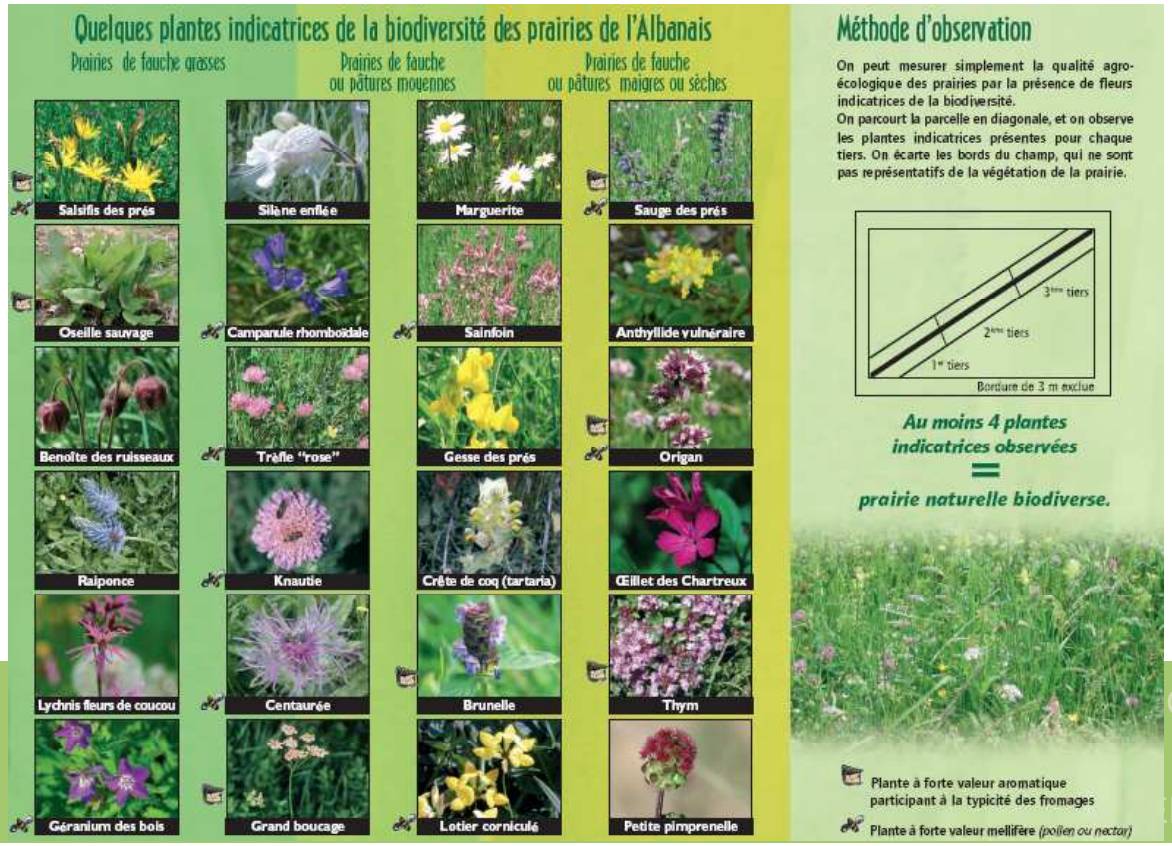
-Before 2007, obligation of means : complex, restrictive and badly received by farmers.
- Since 2007, obligation of results: A simple indicator is used to assess both ecological and productive quality of meadows : more than 4 flower species among a list of 24.



Example from C. de Sainte Marie et al, 2008

Conclusion (1)

We are faced with a paradox :

- **innovative design cannot be programmed (by definition) ;**
- **it is essential for the objective of innovative design to figure fully in the programmes of research bodies, to contribute in shaping scientific priorities, interdisciplinarity and partnership.**

Conclusion (2)

The importance of taking into account in research for innovative design:

- **the expectations of farmers and agro-industry,**
- **the need for dialogue and help for collective action at territorial level,**
- **the specific needs of public decision, where the search will be for institutional innovation that will favour agronomic or agro-ecological innovation.**

Thank you for your attention

Enquête sur le concours de Prairies fleuries :
ce qui a changé du côté des éleveurs **(C. de Sainte Marie)**

Avant (obligation de moyens: des pratiques imposées):

- **« *Les écolos du Parc vont encore nous faire chier avec leurs jolies petites fleurs* »**
- **« *Nos prairies ne sont pas un musée !* »**
- **« *Retour à la nature, non merci !*»**

Après (obligation de résultats et concours des prairies fleuries):

- *« Le bon agriculteur est récompensé, le mauvais ne l'est pas...* ***[alors qu'avant] du moment que tu tiens bien tes cahiers, c'est fait, tu peux tenir ta prairie comme un pâtier ».***
- ***« Pour une fois, on reconnaît quand même ce que l'on fait […] C'est vraiment*** *important de pouvoir dire aux gens qu'on n'est pas des gros pollueurs »*