

# Landscape Agronomy

Background concepts and emerging challenges to address agri-food system design beyond the farm level



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**INTERNATIONAL  
WORKSHOP  
FOR FARMING SYSTEMS DESIGN**

Designing Climate Smart Agricultural Systems  
for a Sustainable Transformation  
in the Agri-food Systems of the Dry Areas

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# Landscape Agronomy

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# Landscape agronomy contribution to FSD

- ◆ 1. Thematic challenge
- ◆ 2. Landscape agronomy
- ◆ 3. Examples and perspectives for FSD

# 1. Thematic challenge



# Thematic challenge /1 general intro

## Farming systems design vs divergent land management issues



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*Scène de labour et de semis dans un champ, Maroc. 31/03/2016*

- ◆ **Farming system design** has to account for divergent uses and expectations of multiple stakeholders, thus to integrate spatially explicit land management issues and socio-technical systems operating beyond spatial constraints:
  - ◆ **Farming system research** needs to address how global agri-food systems evolve through the transitions of local farming systems.
  - ◆ **Intensification** of agricultural productivity to meet food security and safety goals can conflict with the sustainable use of natural and local resources.
  - ◆ **Climate change** and socio-economic instabilities create uncertainties for stakeholders, especially in drylands.

# Thematic challenge /2 beyond the field edge

## ASA President's Message, Jerry L. Hatfield, 2007



American Society of Agronomy  
*Agronomy feeds the world*

<https://web.archive.org/web/20090514162108/https://www.agronomy.org/about-society/presidents-message/archive/13>

”

The development and implementation of concepts such as multifunctionality and **landscape management** represent areas in which I believe agronomists need to become engaged and **understand the implications** of how one field links to many others across the landscape.

”



# Thematic challenge /3 scientific gap

## Contributing to a landscape sustainability science

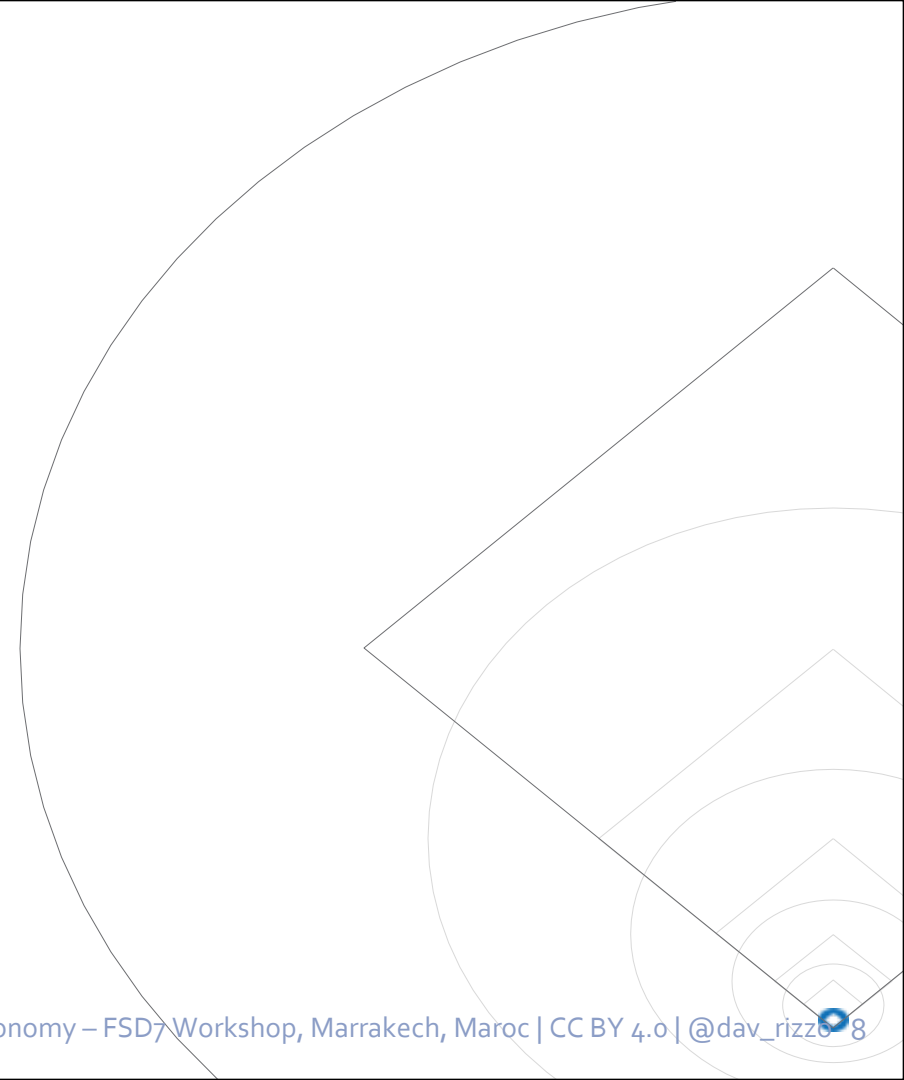
- ◆ **Spatially-explicit approaches** in agronomy tend to address specific (embedded / hierarchical) spatial scales BUT farming systems include also non-spatial management issues
- ◆ **Landscape level** is the best candidate to address sustainable farming system design because it integrates physical (spatially explicit) processes and socio-technical systems \*
- ◆ HOWEVER, the landscape has been mostly addressed by agronomy as a spatial scale only, hence losing all the richness of a **system approach**
- ◆ “Increasing landscape-level management in agricultural lands requires a science of **landscape agronomy** yet to be fully developed” \*\*

\* Sayer et al (2013) Ten principles for a **landscape approach** to reconciling agriculture, conservation, and other competing land uses. *PNAS*.

Wu (2013) **Landscape sustainability science**: ecosystem services and human well-being in changing landscapes. *Landscape Ecol* 28:999–1023.

\*\* Estrada-Carmona et al (2022). **Complex agricultural landscapes** host more biodiversity than simple ones: A global meta-analysis. *PNAS*, 119(38), e2203385119

# 2. Landscape agronomy





# Background concepts and issues

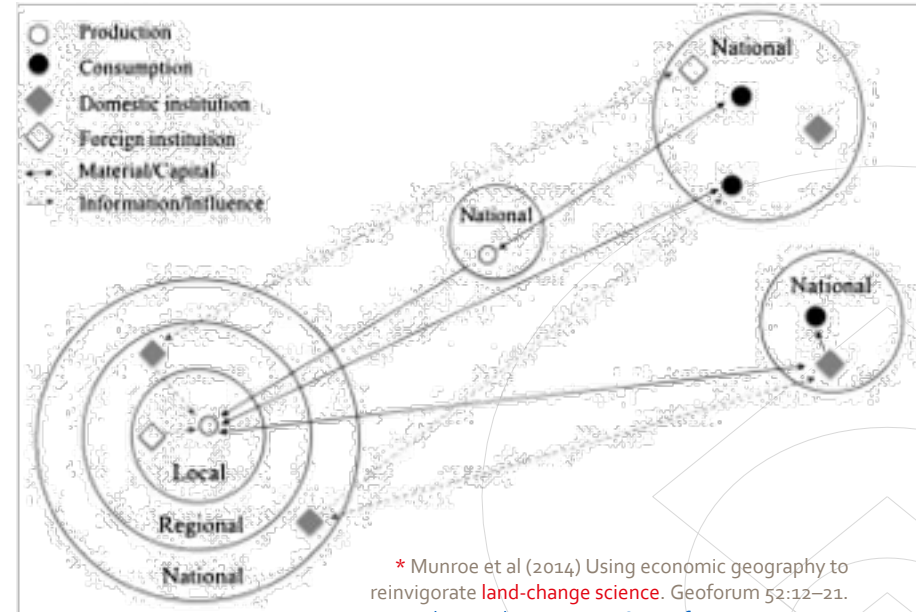
## How to anchor field and farm management to landscape?

**Farmland** is a limited resource that hosts place-based activities linked to wider networks \*

**Farm** is the core management unit laying at the node of entrepreneurial networks

**Farming system design** requires to integrate place-based activities and entrepreneurial networks that go beyond field and farm-gate.

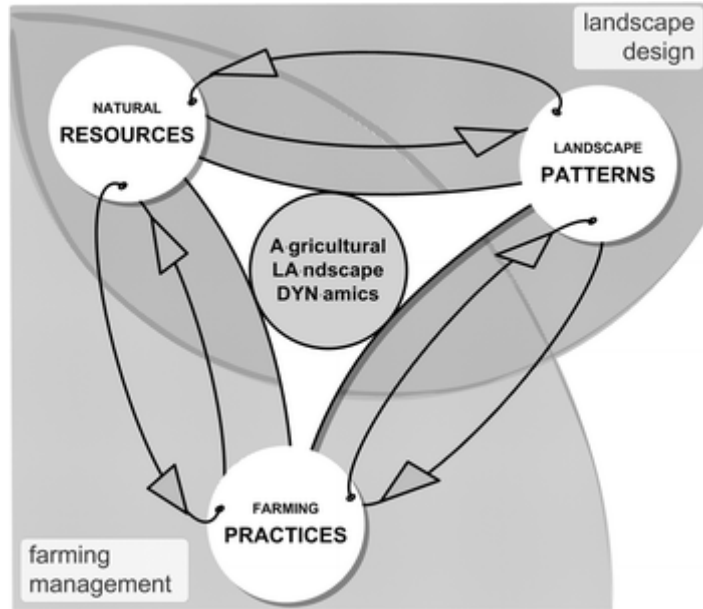
**Landscape** is intended here as a level that integrates economy, environment and the local socio-cultural identity.



\* Munroe et al (2014) Using economic geography to reinvigorate **land-change science**. *Geoforum* 52:12–21.  
<https://doi.org/10.1016/j.geoforum.2013.12.005>

# Landscape agronomy is a system perspective

## Observing, understanding and supporting action



This framework addresses **spatially-explicit management** of agricultural activities at the landscape level.

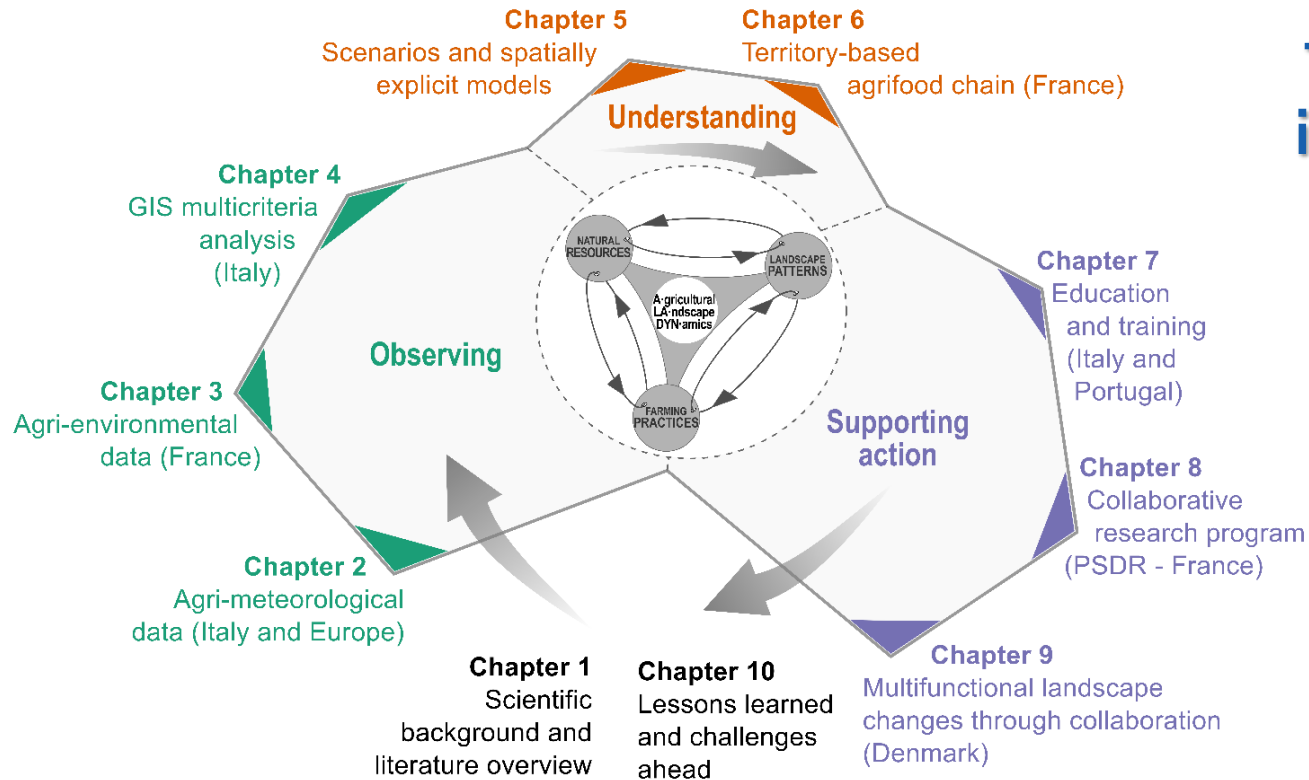
It integrates the **cropping system** notion and **geographic methods** for system observation

Benoît M, Rizzo D, Marraccini E, et al (2012) Landscape agronomy: a new field for addressing agricultural landscape dynamics. *Landsc Ecol* 27:1385–1394.

# 3. Examples and perspectives for FSD



# What is landscape agronomy about?



## Ten chapters to illustrate its use and challenges

Rizzo D, Marraccini E, Lardon S (eds) (2022) Landscape Agronomy: Advances and Challenges of a Territorial Approach to Agricultural Issues, 1st Ed. Springer International Publishing, Cham, Switzerland

# Examples

## How landscape agronomy can help farming system design?

Main novelty is to help **agronomy** identifying the **components** of the landscape level and to explicit the **interdisciplinary** links.

This has helped to **frame** research and extension services, and to **inform** decision and policy-making.

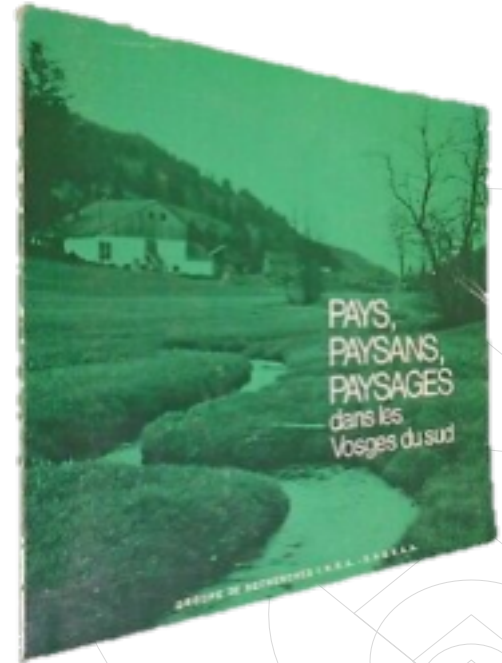
In perspective, it should feed **geoprospective** and ease **coordination** among landscape stakeholders

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- [5] Houet & Verburg (2022) **Exploring Futures** in Landscape Agronomy: Methodological Issues and Prospects of Combining Scenarios and Spatially Explicit Models. In: *Landscape Agronomy*, Springer, pp 163–181
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# What's next?

## Sustainable farmland management at the landscape level

- ◆ The book (Springer 2022) follows the ideas of “**Pays, Paysans, Paysages**” (INRA-ENSSAA 1977)
  - ◆ Focus on the role of agriculture in the **management** of local economy, resources, and culture by associating the **territory** (as an administrative entity), farmers and landscape.
  - ◆ The title could be rephrased as “**Participation, Prospective and Public Policies**” to address agriculture within the broader commitment to achieve **sustainability** of human activities and UN SDG as the best known targets.
- ◆ **New questions** can be raised
  - ◆ How to explicitly consider **temporal dimensions** of agri-food land management units?
  - ◆ How to account for the **(invisible) patterns** emerging from newly available data and agricultural digitalisation?



# Further references

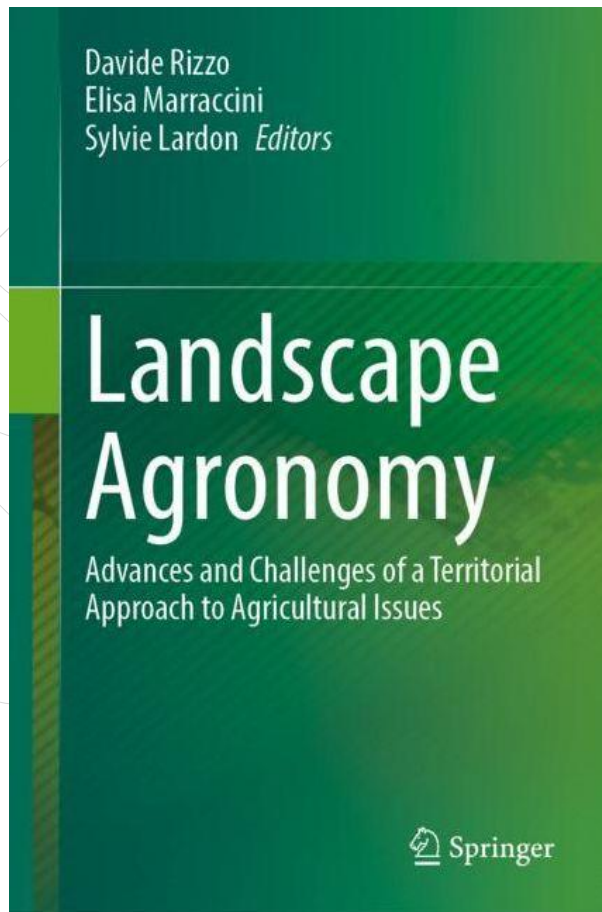
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## ◊ MENA region

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- ◊ Lardon et al (2016) Prospective participative pour la zone urbaine de Pise (Italie) : l'eau et l'alimentation comme enjeux de développement territorial. *Cahiers de géographie du Québec* 60:265.
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- ◊ Soulard et al 2018. Peri-urban agro-ecosystems in the Mediterranean: diversity, dynamics, and drivers. *Reg Environ Change* 18, 651–662.



# Thank you for your attention

Rizzo *et al.* 2022, FSD7

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