Analyzing the risks & adaptations of farmers in flood affected and peri-urban areas

Nina Graveline, Laure Hossard, Coline Perrin - **INRAE UMR Innovation**
Clémentine Amiot, Rosan De Lange, Gaelle Balestra

International Workshop 16 -17 may 2024

Cafrua Project : Challenges of Agriculture adaptation to Flood Risk in Urban Areas: synergies between flood protection, urban planning and peri-urban agriculture development

Specific « case for action » of peri-urban & flood vulnerable lands

the mediterranean areas as a hot spot of climate change & consequent natural risk occurrence

The « urban » setting increases flood hazard

- City (impermevious areas) increase the hazard downstream
- increased in areas where constructions are developed in extension rather than densification

The potential role of agriculture as a flood buffer…

agricultural land can play a voluntary & involuntary role of risk reduction for the city, and is thus affected

… & **other reasons to support the development of peri-urban agriculture**

Thus **adaptation challenges of these farming systems** are important & key for their survival

- If specific policies exist (urban agriculture & flood mitigation) **no specific policies or support mechanisms** exist for farmers with these conditions

An opportunity to build on synergies between agricultural conservation & flood management ?

Research questions & Objectives

- How to analyse resilience of farms exposed to different hazards?

- What are the determinants of resilience of farms ? What are the conditions for maintaining resilient farming in these specific areas ?

The aim of this work is :

(1) to analyze the multiple risks faced by farmers located in the Montpellier Metropolitan Area in both flood-prone and peri-urban areas

(2) to analyze their adaptation strategies in the face of these risks

(3) to explore supporting mechanisms

Conceptual framework

- Concepts used
  - **Multi-risk** is *risk generated from multiple hazards and the interrelationships between these hazards - and considering interrelationships on the vulnerability level - (Gill et al. 2022)*

    Embracing a multi-risk perspective enables to reflect better on the actions/strategies
  - **Resilience** is the ability of a social, ecological, or socio-ecological system and its components to anticipate, reduce, accommodate, or recover. from the effects of a hazardous event. (IPCC)
  - **Different type of resources** are mobilized to take response in the face of a multi-risk

The so-ii / peri urban & flood risk area

- The Lez, Mosson, Or basin, a mediterranean & urbanized basin of 1156 km2
- Peri-urban agricultural areas characterized by
  - Proximity of the city and urbanized residential areas
  - commercial & business areas (« ZAC »)
  - transport infrastructures (highways, train, aeroports)

  … all three that expanded largely over the last decades
- A certain variety in agricultural systems, vine is, however dominating
- Land abandonment & speculation

Method

- **Data collection** with a survey (spring & summer 2022)
  - face to face & semi-structured interviews
  - Use of trajectories : a mean to dialogue with the farmer and try to relate the major hazard & his decisions (adaptation or other major)
  - 28 surveys realized

Two main types of farming system are presented : market gardening (10 farms) and viticulture (9 farms). The remaining were too scarce (cereals, livestock, horticulture, fruit trees)

Risk perceptions

- Floods nor « urban » associated risks are not the main risks cited
- As expected other climate related risk are frequently cited
- Unexpected risks are mentioned and can be associated directly or indirectly to the proximity of the urbanisation/infrastructures

- Some farmers mention the combination of hazards as threathening & the repetition of events that threaten their resilience

- Note : a difficulty to assess the impact on a quantitative /comparative basis
  - Perceptions
  - No standard indicators

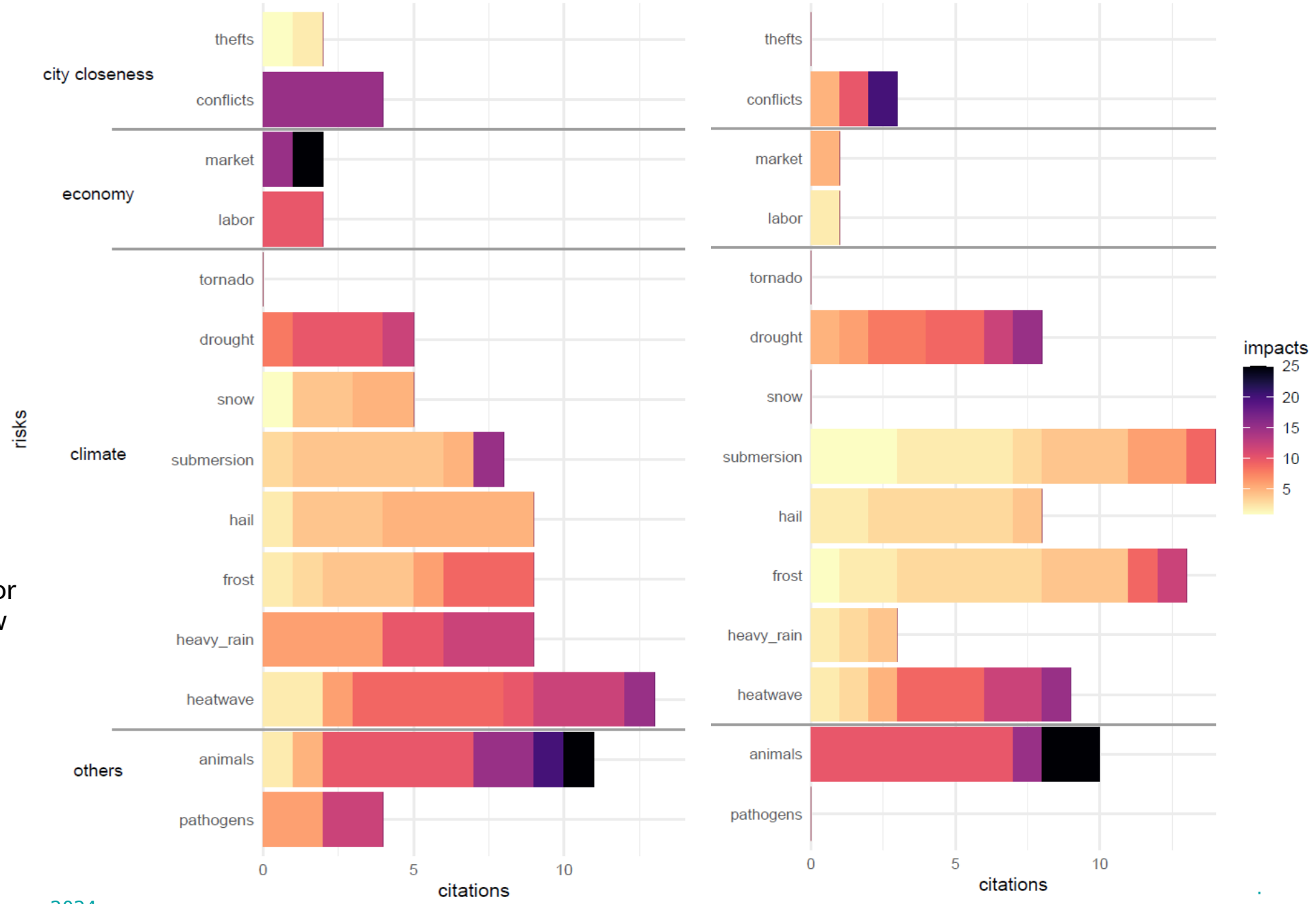
Risks perceptions for (i) market gardening and (ii) winegrowing

- **Heatwaves & pathogenes** seems to affect marketgardening more
- **Frost & Droughts** affects more winegrowing

⇒ more affected by hazards that are not « zoned » and that are global

⇒ Urbanization as a catalyst for climate associated risk (new infrastructures) that cause uncompensated damage

⇒ Zoning perceived as constraints (building restrictions)



Adaptations mentionned in the face of risk

* In 45% of the cases an hazard is mentionned without adaptation as response
* ***Ajustment*** is the most adopted adaptation type, compared to *absorb* (no response), *avoid* or *transform*

Type	Market gardening	Vinegrowing
Peri-urban	-	-
Economy	-	-
Climate	**Physical adaptation** (bleaching of greenhouses, drainage channels, ditch management) **Crop or variety change**, adaptation of cropping calendar (later sowing/harvesting) Water management (drip irrigation)	Adaptation of the calendar (pruning date) Soil cultivation (grass cover) Physical adaptation (hail rocket, ditch management) Water management (drip irrigation) Crop management (resistant grape varieties)
Other	**Physical protection from animals** (netting, hunting, fencing)	**Physical protection from animals** (hunting, fencing) Chemical protection (pesticides, mating disruption)

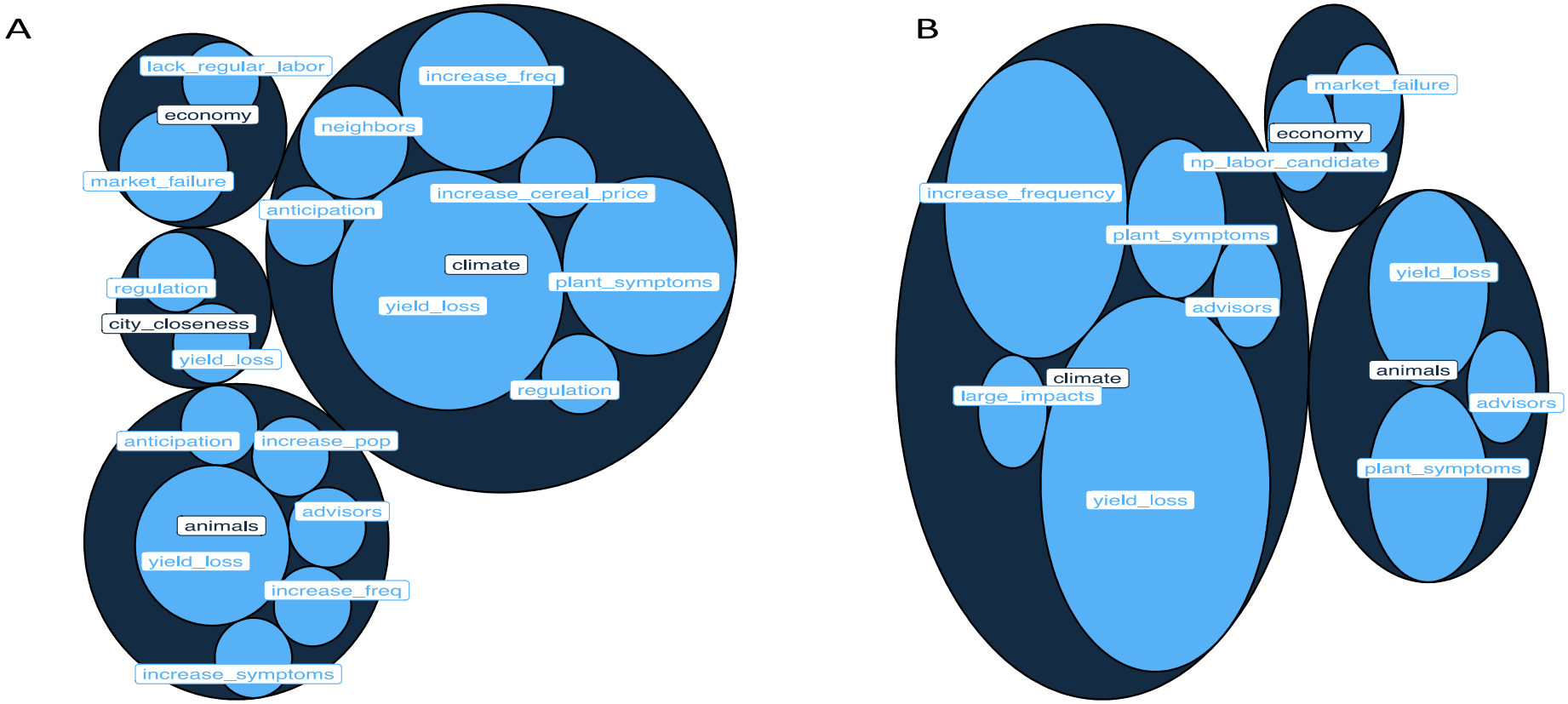
Only those sited more than 3 times are cited, in bold > 10 times

=> Real « strategies » (combinations of adaptations) are little discussed

Main motivations of farmers for taking adaptations per category of risks

in market gardening (A)

vineyard (B)



* Yield loss observation as a main trigger to adaptation, plant symptoms is the 2nd
* Difference between systems are modest

How to promote resilience of farms in these territories ?

Technical measures aimed to adapt plots of land and farms and reduce hazard, exposure or vulnerability.

Strategies	Examples of « technical » measures
Downstream reduction of risk	- Removal of merlons/obstacles - Over-flooding
Reduction of risk for the farm	- Ground cover to improve infiltration - Green infrastructures to reduce soil erosion (hedges, ditches, keylines, etc.)
Increase of resilience & reduction of vulnerability	- Crop diversification - Ecological labels

***In situ* & downstream reduction of risk**

How to encourage changes in practices and the adoption of new technical measures?

Accompanying measures : facilitating access to knowledge, instruments, and networks (among which markets)

…help the resort to…

Regulatory instruments:
Flood Prevention plans (PPRI), Urban zoning plans (PLUi)

Financial instruments:
- Flood specific (PAPI…)
- None specific (PES/AgroEnvironemental measures, Insurance)

Land tenure contracts:
- environmental rural leases (ERL) (in Fr : baux ruraux environnementaux) and environmental real obligations (ERO) (in Fr : obligations réelles environnementales)

To be combined in strategies

Effect on adoption of technical measures

Concluding remarks

Implications for policy

Dominant risks are not those caused by the specific conditions (urban & flood), however they add to major global risks

Agriculture with specific constraints & benefits for society => must reflect on who must support / take risk in these areas ?

- Better risk sharing mechanisms : is it still worth entrepreneurship ?
- How far should farming be concerned by planning : from regulations (construction ban) to supporting (e.g. short food channels) ?

Perspectives

- to integrate the resources mobilized as a way to interpretate resilience profiles (with network/connections as a resilience factor)

- co-design supporting mechanisms that would help farms increase their resilience in these areas

Thank you !

Two original and little-used land tenure contracts

Environmental rural leases (ERL) (in Fr : baux ruraux environnementaux) **: modifies the farm lease**

- Environmental clauses (16 possible)
- Lease price can be reduced

Environmental real obligations (ERO) (in Fr : obligations réelles environnementales) **: binding on tenants and future owners**

- Contract between the owner and a public institution / legal entity (e.g. *Conservatoire des Espaces Naturels*), up to 99 years
- Purpose: to maintain, conserve, manage or restore biodiversity or ecosystem services.
- Close to conservation easements