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MAGIC

Multi-scales adaptation to face global changes in coastal areas: some results of the MAGIC project

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Introduction. Global changes in coastal areas

- **Combining challenges in coastal areas**
  - *Climatic*
  - *Demographic*
  - *Biodiversity*

- **Adaptation**
  - *Humans and non-humans*
  - *Diverse scales (spatial, temporal, organizational) and levels*
  - *Usually see as a 'good thing'*

- **Some questions**
  - *(Unintended) consequences of adaptation?*
  - *A single-focal scale?*
  - *Under-estimation of interdependencies, feedback processes, transfers and complexity ?*

Photo: T. Quinn

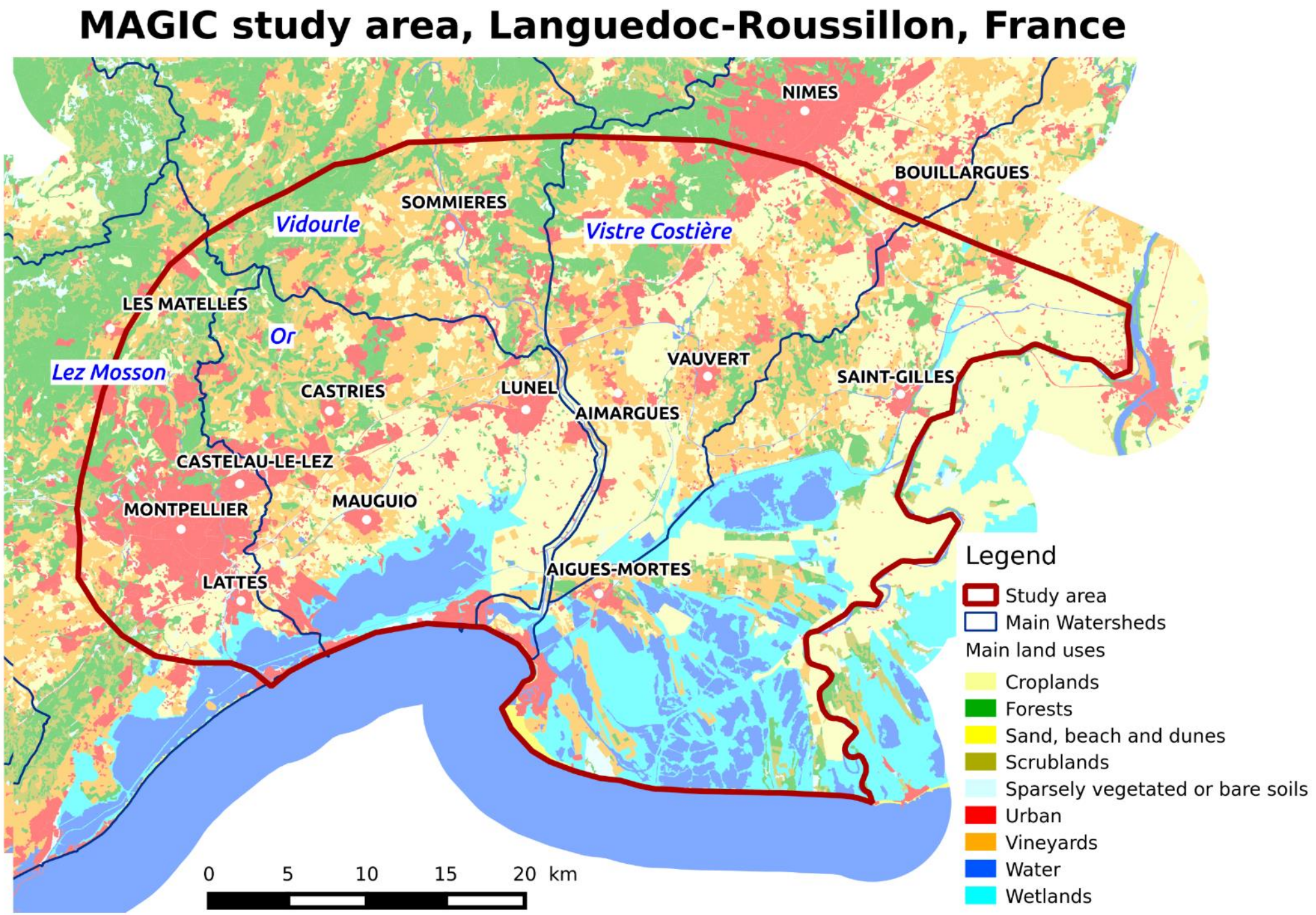
Introduction. The MAGIC project

- **Multi-scales adaptation to global change in coastlines**
  - *Belmont Forum*
  - *36 months (2014 – 2016)*
  - *Numerous partners (FR, UK, SA, US)*

- **Three coastal regions**
  - *Cornwall in UK*
  - *Garden Route coast in South Africa*
  - *Languedoc coastline in France*

- **PostDoc (27 months): 19 in CNRS, 8 in IRSTEA**

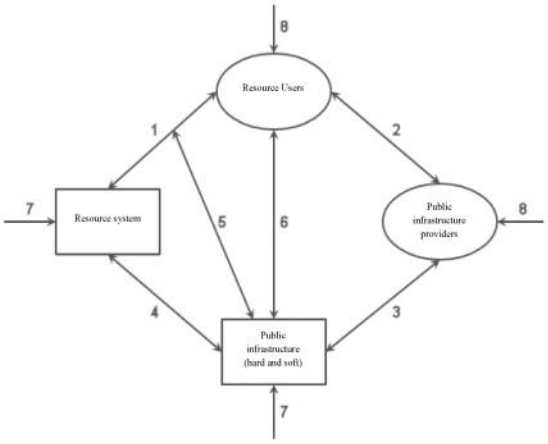
Introduction. The French study area



Methods

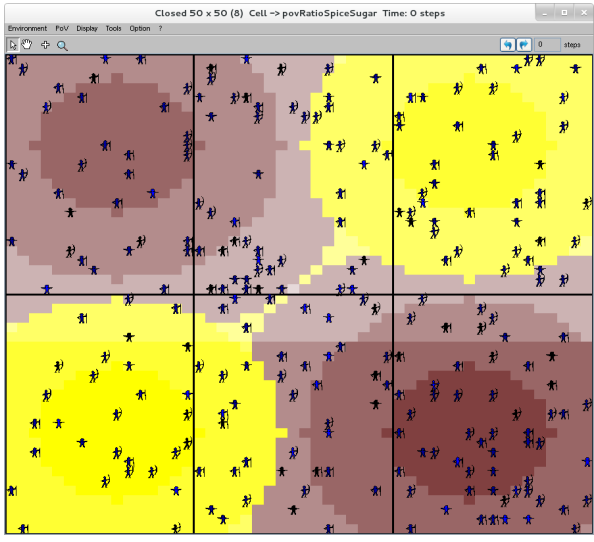
- **3 types of approaches**

1. *Systemic analysis through the robustness framework: the Languedoc case study*



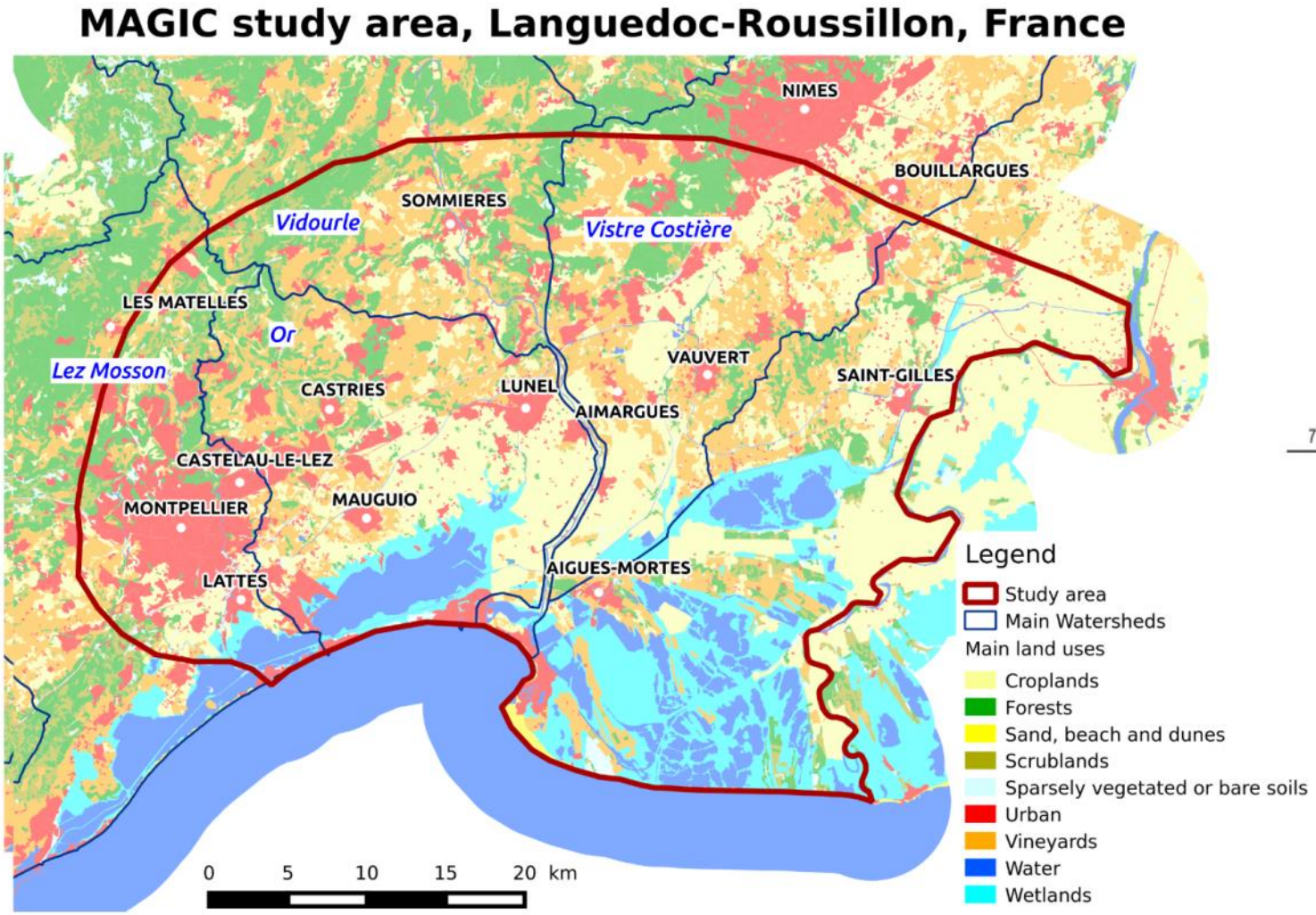
2. *Cross-national comparison of coastal management through an inductive approach and thematic analysis*

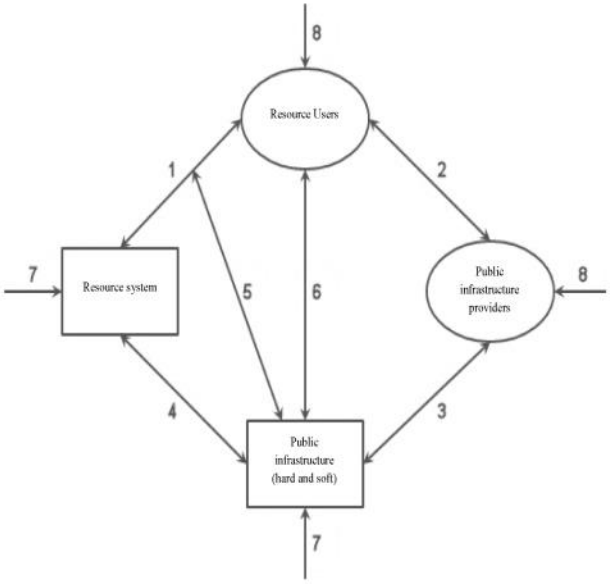
3. *An artificial society to explore the dynamic of vulnerability, adaptation and transfers*



1. A systemic analysis of the LR case study:

Use of the robustness framework

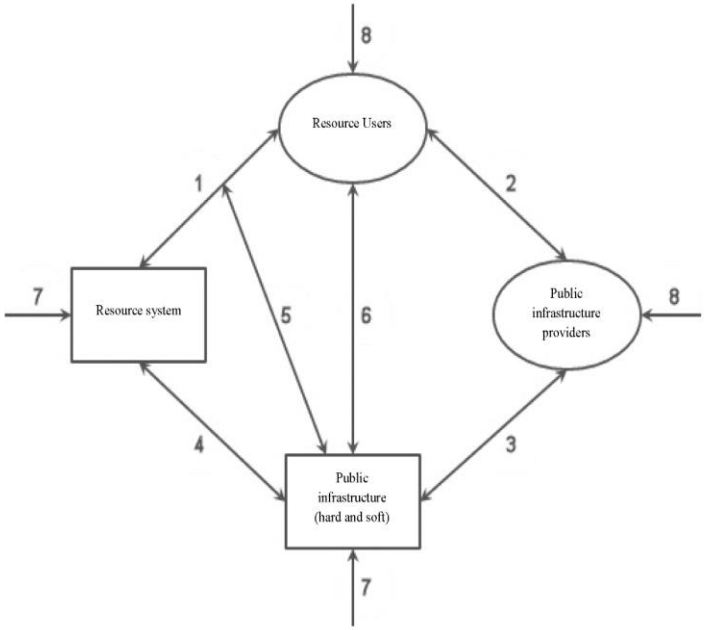




Results. 1. Robustness

- **Use of the robustness framework**
  (Anderies et al. 2004)

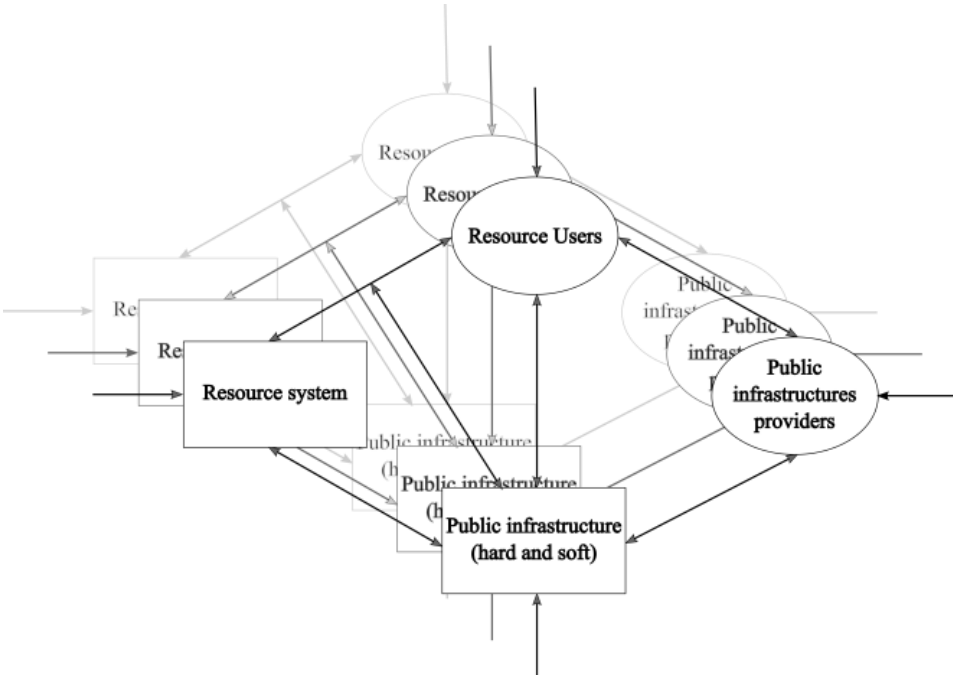
- **4 main components**
  - *Resource users, resource system, public infrastructure providers, public infrastructures (hard and soft)*



- **Interacting through feedbackloops and non-linear dynamics**
  - *Link 1-6*

- **Submitted to exogenous drivers**
  - *Link 7-8*

- **The Languedoc study case through three points of view**
  - *Land-use planning*
  - *Coastal management*
  - *Biodiversity conservation?*



Results. 1. Robustness

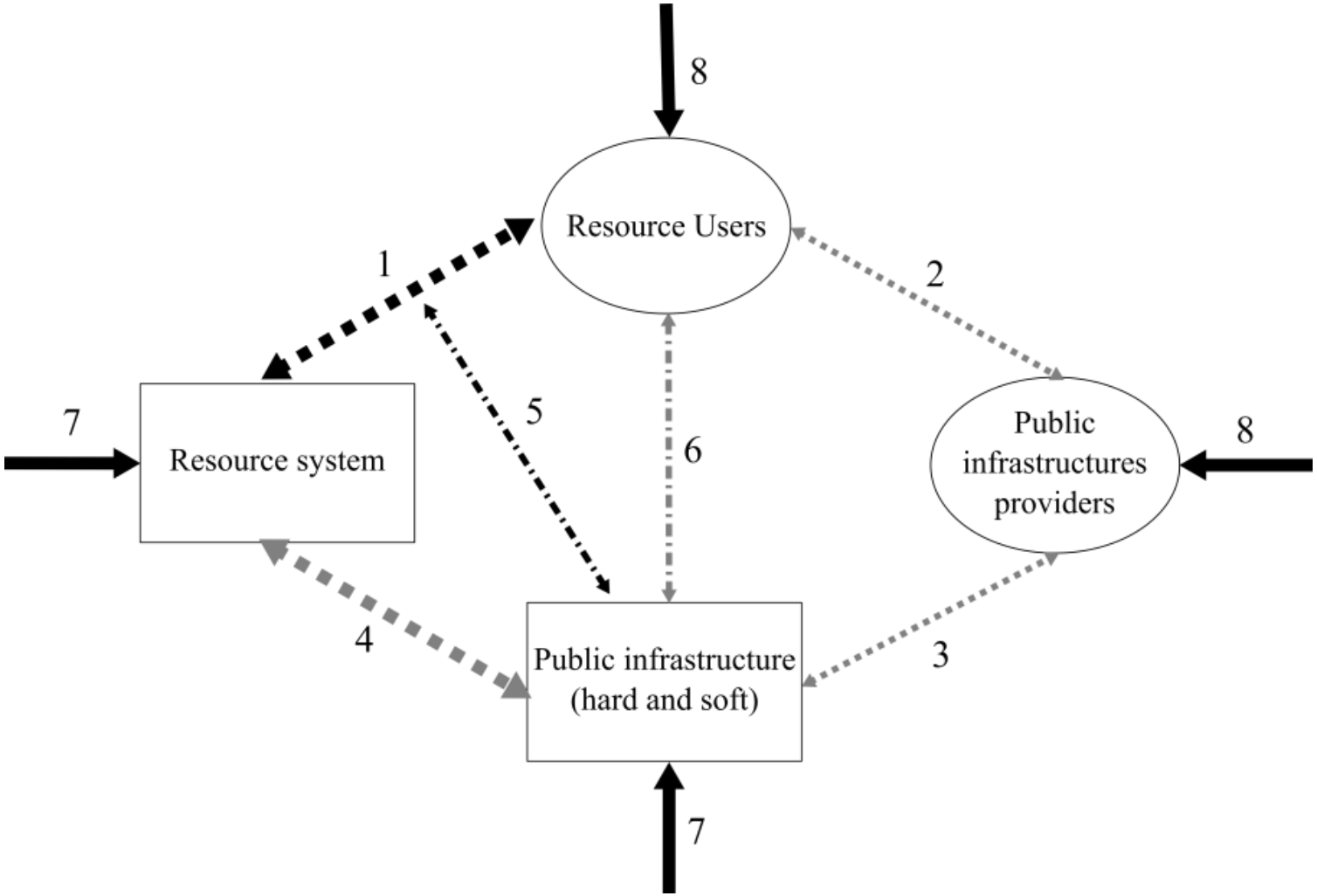
- **Land-use planning**
  - *Demographic pressure, climate change and biodiversity decline (Link 7 and 8)*
  - *Pressure on resources (land and water) (Link 1)*
  - *Exacerbated by:*
    1. *Ideology of growth: Impact of current political choices and host-policy (Link 2-3-6) and lack of constraining rules (Link 6)*
    2. *Lack of climate change anticipation and associated rules (- Link 6)*
    3. *Biodiversity compensation policies (Link 5)*
    4. *Infrastructures conducting to urbanization in risky areas (Link 4)*
  - *Lack of coordination (aggregation rules) among scales*

- **Coastal management**
  - *Expected climate change impacts (Link 7) : resource availability (Link 1), robustness of infrastructures (Link 4)*
  - *From hard to natural and soft infrastructures (Link 4)*
  - *'Denial' and question of responsibility,'good' scale to adapt (Link 2-3-6, Link 8)*

- **Biodiversity conservation…**

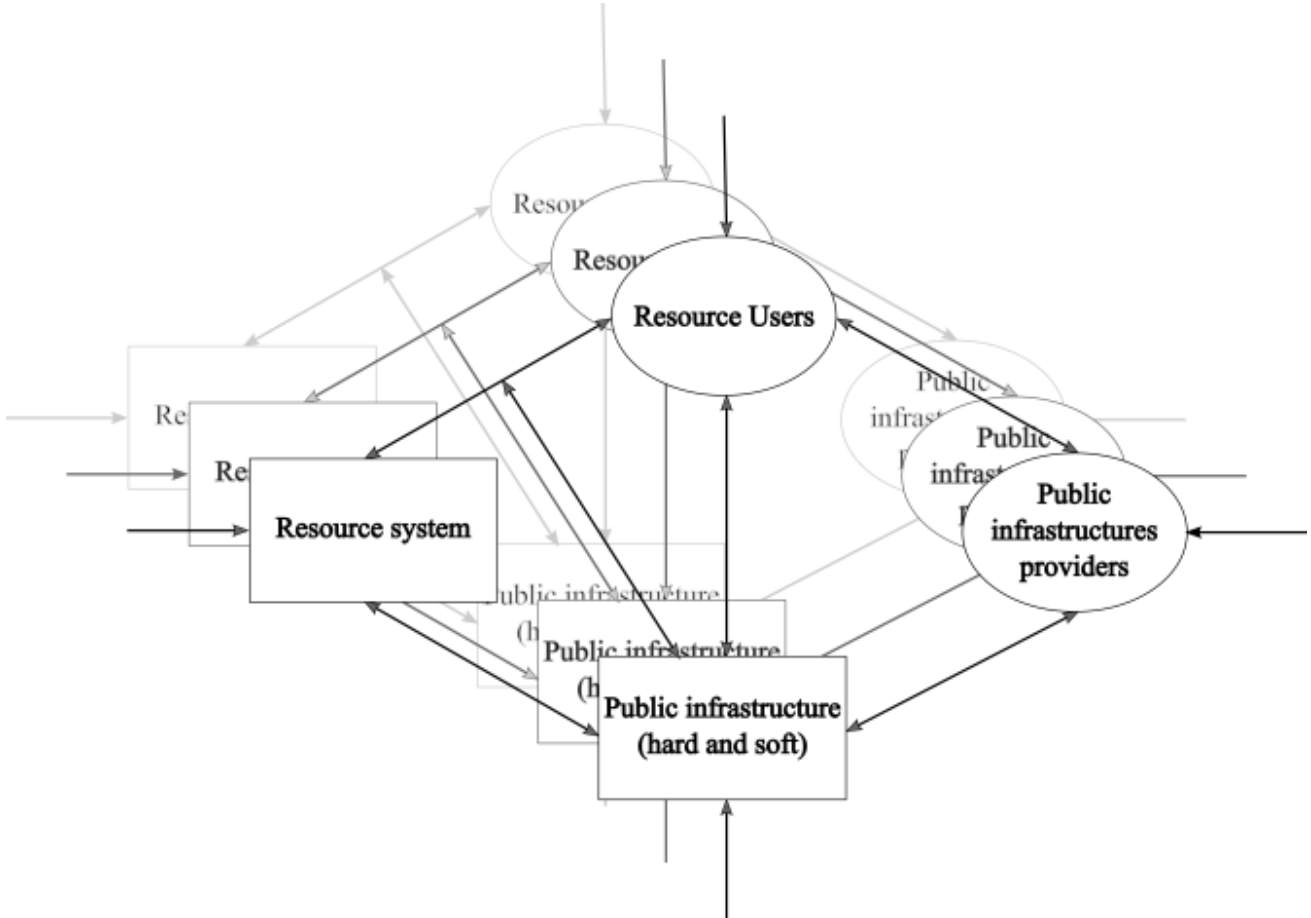
Results. 1. Robustness

- **Main conclusions**
  - *Some resources as centrepieces through scales*
  - *Infrastructures as transmission belts through scales*
  - *Main trends: Changes (Link 7 and 8); Pressure (Link 1 and 4); Redefinition (Link 2-3-6 and 4); Challenge (Link 5 and 6)*



Results. 1. Robustness

- **Strenghths and weaknesses in Languedoc**
  - *Towards integration: sharing responsibilities, integrated management, live with change*
  - *Limits in practice: cultural and institutional inertia, power struggle, efficiency of aggregation and boundary rules, long-time perspective*
  - *Need for a contextual perspective on adaptation and for a pathway approach*



2. Framing coastal management: insights from a cross-country comparison

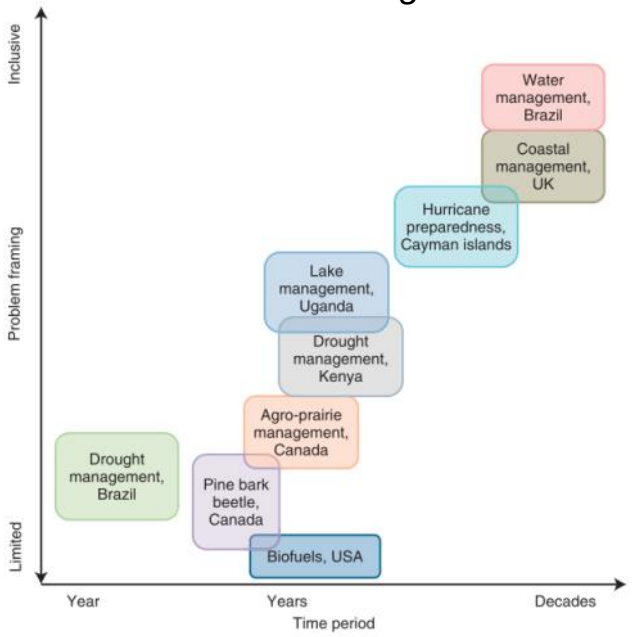
Photo: C. Fabricius

Photo: T. Quinn

Results. 2. Framing coastal management

- **Frames**
  - Origin in cognitive psychology and anthropology, but is now becoming a ‘passe-partout’ concept
  - Conceptual tool to convey, interpret and evaluate information, a large system of meaning, or a ‘schemata of interpretation’. Interpretation and evaluative definition of the social world *(Goffman 1974, Gamson et al. 1992, Entman 1993)*
  - Frames can compete, be transformed… Nested levels of framing.
  - Largely used in the literature on climate change *(O’Brien et al. 2007, Juhola et al. 2011, Adger et al. 2011, McEvoy et al. 2013, Wise et al. 2014)*

Adger et al. 2011



McEvoy et al. 2013

TABLE 1. Different framings of adaptation

1.	*Hazards approach.* ‘Hazards’ are closely linked to disaster risk management. This natural disaster frame has been a dominant consideration in policy discussion on extreme events in Australia, particularly in the context of sudden onset events such as bushfires. Increasingly, broader notions of climatic hazards are now being adopted, linked with other socio-economic and environmental trends, for example, population expansion into bushfire-prone areas in South East Australia or coastal zones likely to be affected by sea level rise or storm surges.
2.	*Climate impacts approach.* This approach focuses solely on climate-related hazards, and obtaining a better understanding of the biophysical and/or socio-economic effects that can be expected in a particular geographic area under various climate change scenarios.
3.	*Risk management approach.* This is the dominant, organizational practice for dealing with many types of uncertainties in local government and the private sector. Central to the notion of risk are uncertainty and perception. Risk is defined as the combined product of hazards, exposure and vulnerability, and there is a close connection between hazards and risk management approaches
4.	*Vulnerability approach.* This focuses on who or what will be affected, and in what way. A wide range of possible policy responses to vulnerability is possible. For example, outcome vulnerability relates to the residual impacts (e.g. on a habitat, an ecosystem or a municipality) after all feasible adaptation responses have been taken into account. A contextual framing of vulnerability considers vulnerability in the broader context of interactions between climate and society.

Source: Fünfgeld and McEvoy (2010).

- **Framing coastal management**
  - Stories / discursive arguments / themes / frames in coastal management?
  - A cross-country comparison
  - Conceptual framing (core) / operational framing (secundary aspects) *(McEvoy et al, 2013; Sabatier & Jenkins-Smith, 1993, 1999)*

Results. 2. Framing coastal management

- **Conceptual framing: Command & control // live with**
  - *Fixist perspective // Mobility*
  - *Line // Interface*
  - *Control // Flexibility, adaptation*
  - *Loose // Opportunity // recomposition*

'The XX century society is a society that control nature, characterized by industrial development, urbanization, which are fixed ways of occupying space, which don't accommodate with changes. So the most commonly used scheme is that there is no reason to give up our grip face to external elements.' (France. Coastal Agency, 2014). [7]

'We have to reconsider our defenses against marine submersions by giving them more thickness, more resilience. The use of natural environments, especially dunes, in a dynamic understanding, and not in an ultimate, definitive or fixed perspective (…) Try not to hold on to the actual coastline, its current configuration, but be able to consider another form of protection, accept eventual relocations, retreats, or at least a recomposition of this land-sea interface rather than facing catastrophic events' (France. Coastal agency, 2014) [7]

- **A continuum**
- **Differences between countries**

Results. 2. Framing coastal management

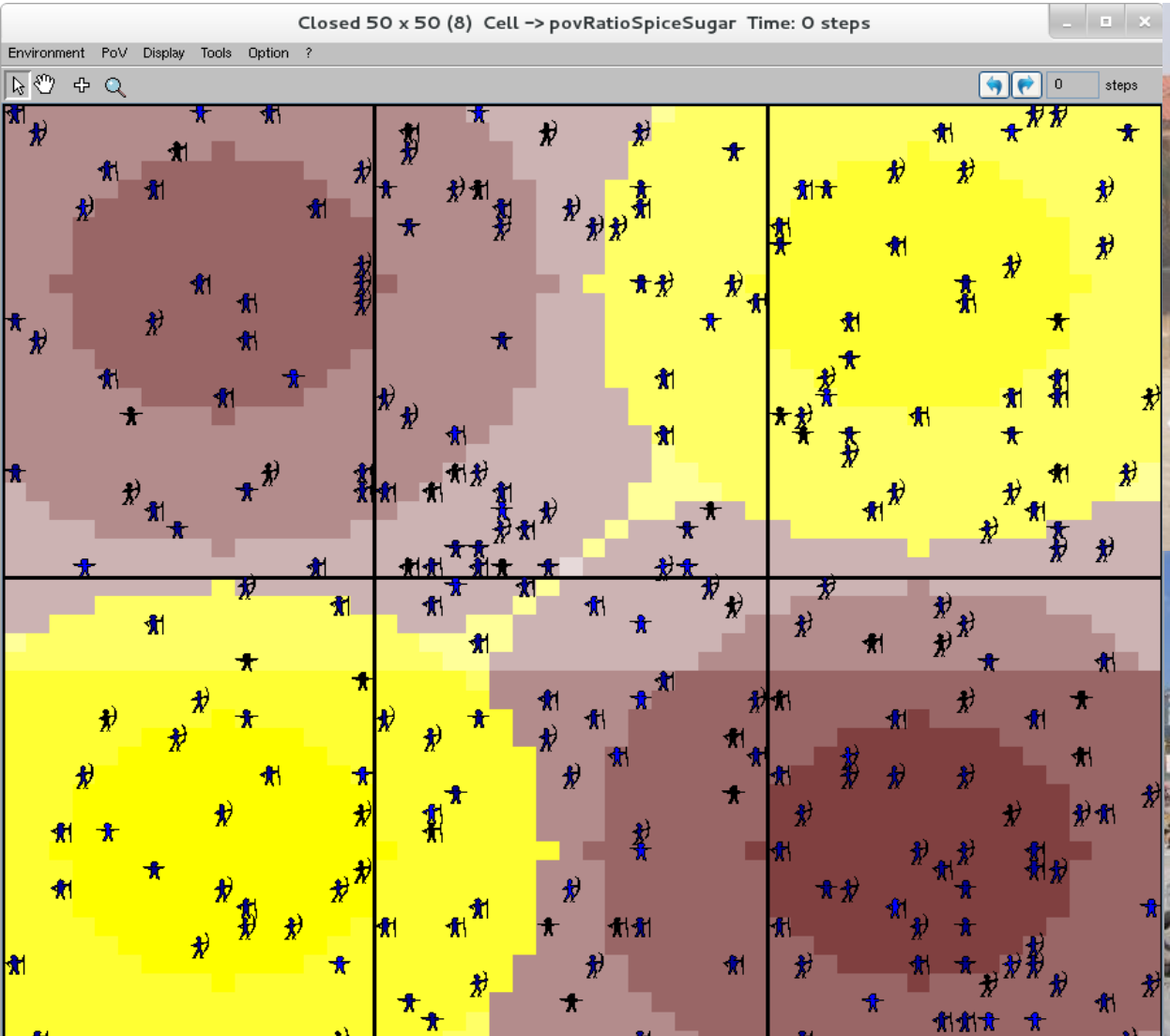
- **Operational framing**
  - *France: how to implement change >> Identify a pathway, importance of tipping points, towards a pluralistic approach*
  - *England: locked in an economic perspective >> a status quo*
  - *SA: focus on social learning and participation*

'*In the Mediterranean area, because it is a touristic sea, a nice and pleasant sea, in the popular imagination, the sea is pleasant and it is not frightening at all. So there is a strong denial of risk*' (France, LR Region, 2014) [4]

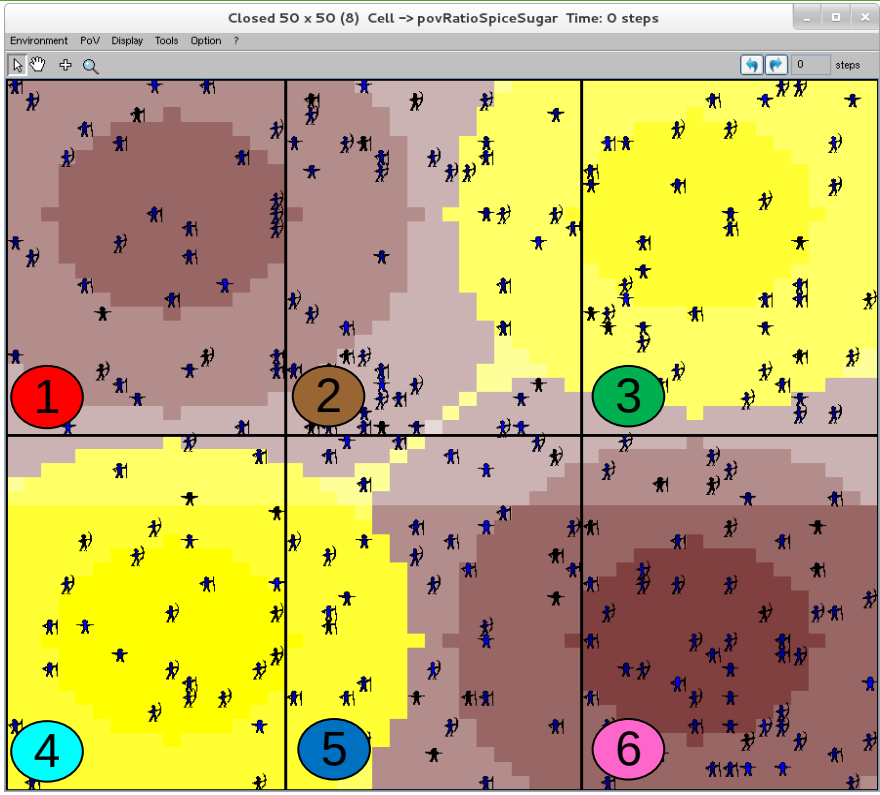
'People don't want to move. So for the moment, we are investing in small improvements such as sand supply or we are helping people to adapt their house. But we know that in 30 years, what needs to be done is to chuck out all of this… This policy, it is like giving time to people (…) Adaptation of the houses, we see it as an intermediate solution before a more definitive solution which is not accepted for the moment…' (France. LR Region, 2014) [16]

'Along the coastline, disasters can have a huge impact. A 'good' Xynthia, it put things into context. This is particularly important along the coastline, but it can also be important for floods. Major, punctual and dramatic events (…). But sometimes, these events have the effect of an electric shock that allows the policies to change direction and shift' (France, LR Region, 2014) [16]

3. Multi-scale adaptations in an artificial society: from sugarscaPe to sugarscaLe



Results. 3. The SugarScale model (with B. Bonté)



- **An artifical world to explore adaptation and vulnerability transfers**
  - *Environment: two resources (suger + spice) and two zones*
  - *Agents: harvesters*
  - *6 States with borders*
  - *Rules*
  - *Perturbations (resource collapse, population growth)*

- **Main elements of the robustness framework**

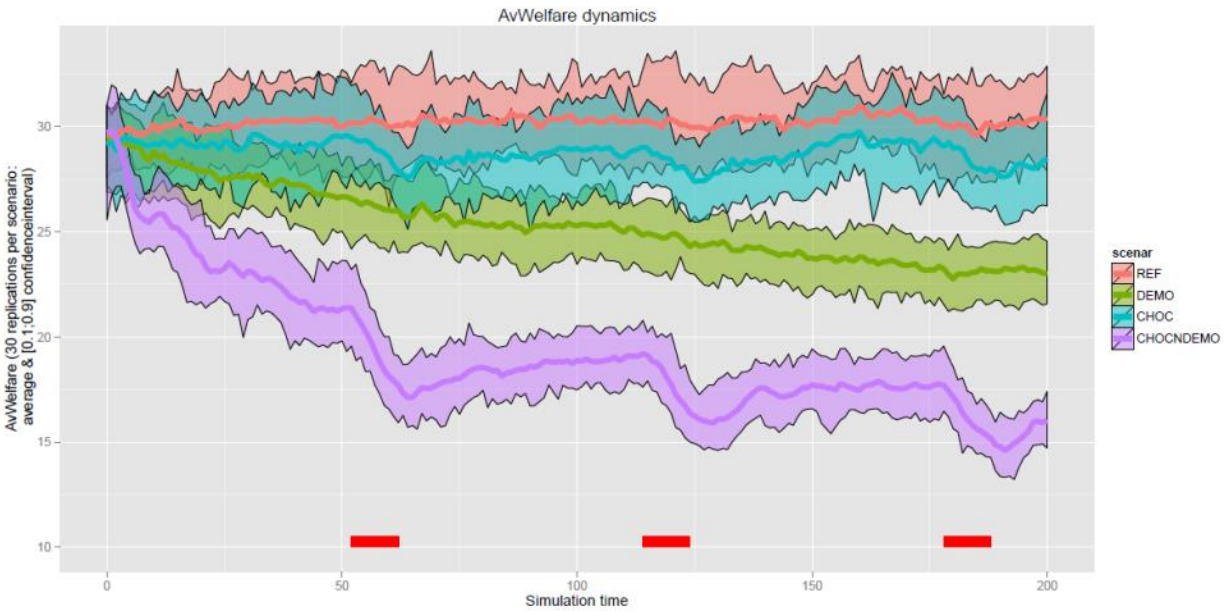
- **Cross-scale and multi-level** (governance, environment, exchanges, time)

- **Studying the feedback loop: perturbation > adaptation > vulnerability transfer**

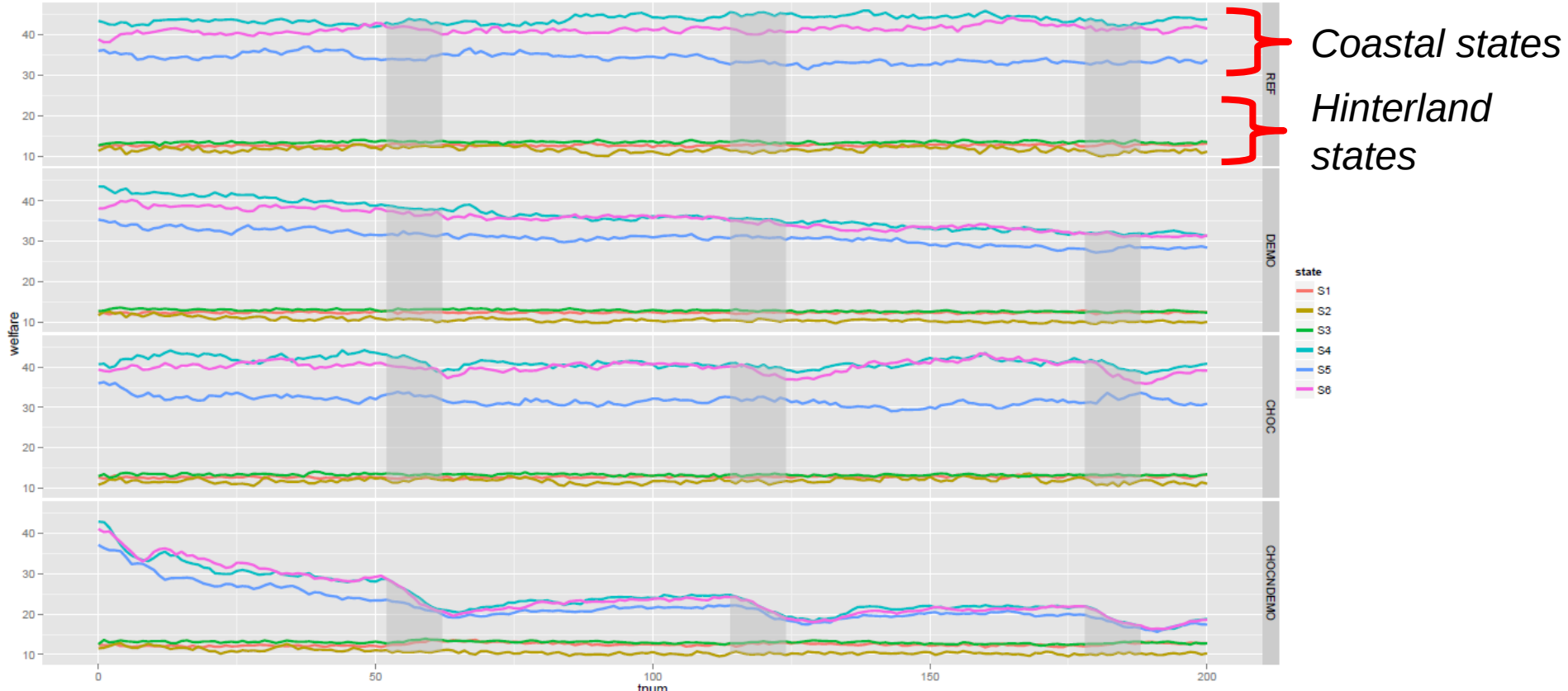
- **Vulnerability indicators (ongoing):** mortality, consumption, average age, welfare…

Results. 3. The SugarScale model (with B. Bonté)

- **Four scenarios**
  - *Ref*
  - *Demographic pressure*
  - *Climate event*
  - *Climate + demographic*



- **Differences between States**



Coastal states

Hinterland states

Results. 3. The SugarScale model (with B. Bonté)

- **Adaptation through migration**

- **Ongoing analysis…**
  - *Vulnerability transfers*
  - *Other adaptation (at the State scale, other types of individual adaptations…)*

Thank you (and to the magic team!)