Participatory modelling of the trajectories of agro-silvo-pastoral systems at landscape and community levels in West Africa

The case of the Senegalese groundnut basin

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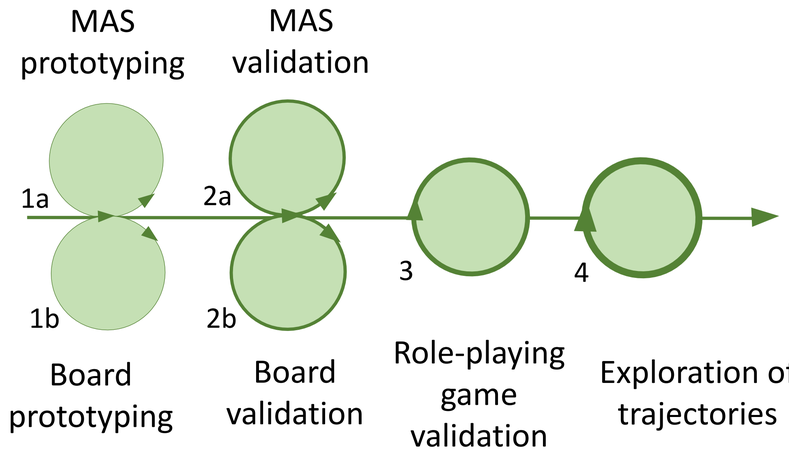
Environmental changes affect landscapes

- Case study: 3 village landscapes with diverse trajectories
- Objective: to understand the rules driving past/future trajectories

Participatory modelling

- To co-construct past/future trajectories with farmers
- Methodology inspired from the ComMod* approach **(Fig. 1)**
- 2 artefacts: a Multi-Agent System (MAS) & a board game designed with farmers

*Companion Modelling see ComMod Group, 2003



Data sources

1a and 1b. Bibliography and experts (farm typology, environmental changes, etc.)
1a. Farm survey on a monthly basis (crop and livestock activities)
2a. 3 focus groups/village (crop and livestock activities)
1 focus group/village (environmental changes)
2b. 1 workshop /village (farmers-artefact interactions)
3. 1 workshop /village (farmers-artefact interactions)
4. 3 workshops /village (trajectories)

Increased data integration

Fig. 1. A comprehensive and iterative approach

A focus group in one of the 3 villages studied (Senegal)

Picture : E. Audouin's workshop, 2013

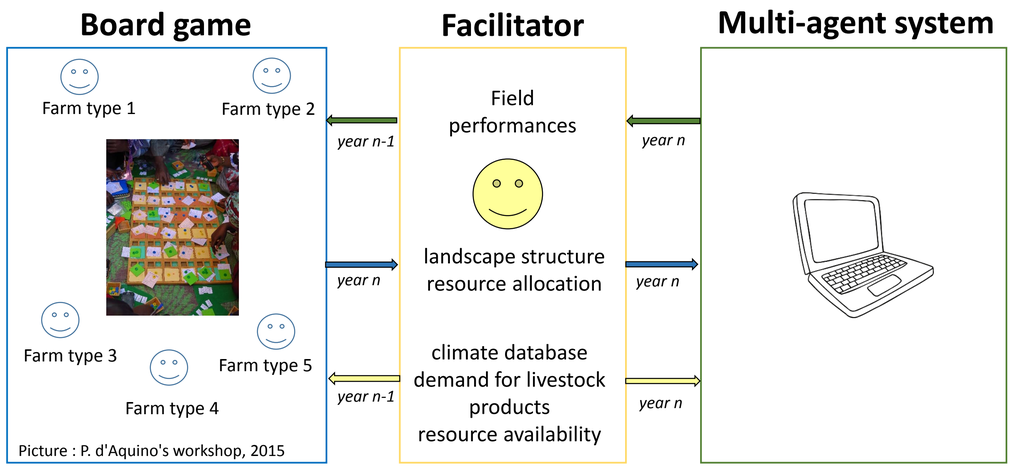
Two different tools used together to explore trajectories during role-playing games

- Computer-assisted role-playing games **(Fig. 2)**
- Farmers interact around the board and use the MAS outputs to make decisions on their activities (= inputs for a new MAS simulation)
- Information flows through a facilitator

- Each round starts a new farming year
- Simulation of environmental changes
  - Climate
  - Demography
  - Markets
  - Policy
- Analysis of farmers' strategic decisions

The Board game

- A simplified version of reality
- Participants play different farm types
- Outputs = participants' decisions on resource allocation :
  - Land use
  - Workforce allocation
  - Equipment purchase
  - Herd management



The MAS

- Simulates farmers daily activities and their consequences on biomass flows
- Integrates decision rules
- Inputs = participants' decisions
- Outputs = farm and landscape sustainability indicators

Fig. 2. Information flows during trajectory exploration workshops

Farmers' individual decisions subsequently modify landscape sustainability

Resource allocations represented on the board game

Corresponding landscape sustainability indicators calculated by the MAS

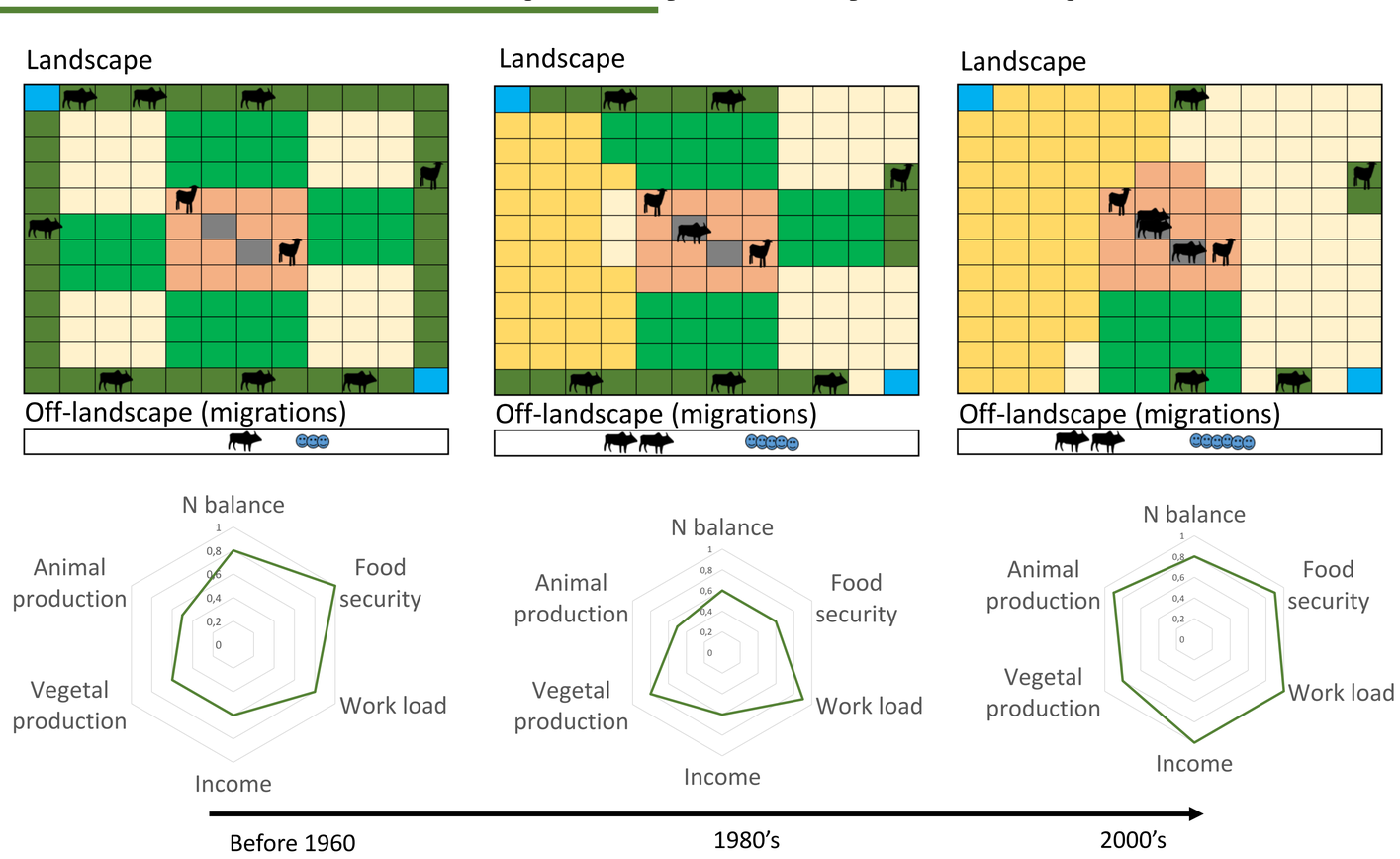


Fig. 3. Expected results of a workshop with farmers