Modeling conceptual framework of social changes in Sahelian land and natural resources uses and regulations

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Abstract

Numerous works underlined for several decades that the land and natural resources issue in Sahel is complex. Resilience of socio-ecosystem primarily depends on actors’ arrangements and practices which are here defined by the overlapping of several land regulation (i.e. rules and institutions) systems, from informal local land rules, which local people recognize and respect, to legal land policy rules that place the major part of the territory under the State responsibility. And while the aim of land tenure security is universally recognized, the debate is still complex between a privatization of lands (through a land access defined by individual private long-term rights, like a Land Title), considered as more adapted to economic investment and a more flexible regulation of land uses (through multiple distinct access rights on the same space, according to the resource, the activity, the season...), based on the local history, allowing an individual and collective adaptation to climate uncertainties, and built on a partial common resources management.

The present study aims to structure the complexity of this land tenure situation, through the conception of a modeling conceptual framework. This framework is based on the assumption that land actors (authorities who regulate access and management of land and natural resources as well as users who use it) are the ones who give meaning and stimulate the different land and natural resources regulation systems, according to the way they behave with each other and with their environment. Regarding their needs, their individual or collective (family, village, lineage, ethnic...) interests, their means and their subjective perceptions, actors build their action logics, deciding which regulation (rule and institution) they want to mobilize or create, how they want to use it etc.

The building of this modeling conceptual framework gathers bibliographical review and field experience through two regional case studies in Senegal, a Sahelian country. The case studies aim to represent the national variety of land issues: an agricultural irrigated / irrigable region with high agricultural potential, the valley of the Senegal river, and a dry region with low agricultural potential, the silvipastoral area. Aiming to link this pluri-disciplinary approach of Sahelian lands issue with the school of multi-agent systems, this modeling conceptual framework is implemented into a computerized agent-based model, in order (1) to initiate the co-construction (between a diversity of points of view) of some original rural land policy

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options, chosen to represent the diversity of the possible positions on the land resource; (2) to bring elements of comparative analysis on the potential relevance of these various options regarding the very concept of resilience.

This potential relevance can be understood as the way a concept of property (individualized, privative, collective or common according to social groups) combined with a regulation system can or cannot maintain, protect and multiply the wealth and the shared advantages while staying in a sustainable development perspective.

**Keywords:** Land and natural resources, Sahel, land public policy, agent, based modelling, impact evaluation