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Multi-level participatory design of land use policies in African drylands: A method to embed adaptability skills of drylands societies in a policy framework

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ABSTRACT

The participatory modelling method described here focuses on how to enable stakeholders to incorporate their own perception of environmental uncertainty and how to deal with it to design innovative environmental policies. This "self-design" approach uses role playing games and agent based modelling to let participants design their own conceptual framework, and so modelling supports, of issues. The method has a multi-scale focus I order to enable the whole multi-scale Sahelian logic to be expressed and on the other hand to encourage the players to deal with possible region-wide changes implied by their "local" policy objectives.

This multi-level participatory design of land use policies has been under experimentation in Senegal since 2008 in different local and national arenas. The process has resulted in the "self-design" of a qualitative and relatively simple model of Sahelian uncertainty, which can be played like a role playing game as well a computerized model. Results are shown in perceptible autonomous organisational learning at the local level. Participants were also able to incorporate their own ideas for new rules for access to resources. They designed innovative collective rules, organised follow up and monitoring of these new land uses. Moreover, meaningful ideas for environmental policies are beginning to take shape.

This work raises the epistemological question of what is meant by the term "indigenous knowledge" in environmental management, ranging from knowledge based on practical experience being included in the scholar's framing of knowledge, to a legitimate local ability to contextualize and re-arrange scientific expertise, to profoundly different worldviews which do not match ours.

1. Introduction

Contrary to common misconceptions, rural people in southern countries have efficiently dealt with ecological and socio-economic scarcity for several centuries (e.g. Mehta et al., 1999; Ostrom, 2005; Reed et al., 2008). This is particularly true in risk-prone environments like drylands (e.g. Behnke et al., 1993; Scoones, 1994; Fraser et al., 2006). Drylands societies have progressively accumulated a rich pool of local knowledge while continuously adapting to each new environmental change. As resources availability remains uncertain both in space and over time, adaptation concerns the shared use of resources, be it by using different resources located in the same place or using the same resource at different times. Adaptability also implies shifting practices from one place to another, or shifting from one activity to another, pastoralist transhumance being the most illustrative example. Drylands transhumance, often lambasted by lay experts, in fact provides herders with the necessary flexibility to respond to the spatial variability and uncertainty of pastures. Furthermore, reasoned transhumance enables efficient maintenance and exploitation of heterogeneous landscapes (e.g. Adriansen, 2008). Both privatisation and the closure of such pastures have been shown to be inefficient in an environment where the location of resources is so uncertain and changeable that static carrying capacity cannot be accurately estimated (e.g. Thébaud and Batterbury, 2001). In fact, disequilibrium models have greater explanatory power for such spatial variability and uncertainty where a rational response would be opportunistic mobility (Behnke et al., 1993) and continuous adaptive changes (Davidson-Hunt and Berkes, 2003). Today, this capacity of adaptative change continues to function in response to economic integration and globalisation (Fraser et al., 2006). In this way, Senegalese pastoralists have managed to seize market opportunities as well as exploit new

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technical devices to further adjust their livelihood system to uncertainty (e.g. Juul, 2005).

However, the continual shifting of practices and locations could result in disordered access to natural resources. The adaptability skills of these drylands societies consequently concern not only flexible practices and shifting locations but also a particular way of designing social rules aimed at conserving flexibility while preventing disorder. As a result, land tenure systems not only enable different uses of the same land but also are embedded in a flexible regulatory framework underpinned by regularly renewed social agreements (Dougill et al., 1999; Mehta et al., 1999). New negotiations on land access rules take place in response to a sudden change in the local situation, and flexible contracts are drawn up in response to unexpected circumstances. For example, pastoralists ensure their access to a sufficiently wide range of landscapes through renewed alliances between scattered communities (Thébaud and Batterbury, 2001; Fraser et al., 2006). The result is a complex pattern of tenure institutions, with some patches of land being managed exclusively, while others are sometimes managed as exclusive resources and at other times, more loosely. Property regimes are likely to overlap both in time and in space with a variety of different institutions operating at different scales and at different degrees of intensity, and to be involved in the management of different portions of the landscape (Berkes, 2002). This flexible institutional framework, which derives from complex interplay between individuals and groups and is based on the negotiation of rights within and between social networks, is probably the most effective way to manage access to resources in such uncertain ecological settings (Scoones, 1994; Fraser et al., 2006). Formalised organisational structures based on territorial boundaries is found to be too inflexible to adapt to such variability and uncertainty, in particular due to the constraints of procedural, bureaucratic, and legalistic approaches (e.g. Dougill et al., 1999).

In fact, the remarkable attitude of drylands societies faced with uncertainty is both embedded in and formed by institutions, agreements, and ultimately values that have been shaped over time (Long and van der Ploeg, 1994; Keeley and Scoones, 2003). This results in a "society attitude" about what is "good", in this case flexible and changing, and "bad", in this case bounded and fixed (Fraser et al., 2006).

Dryland societies' rules and practices may be less suited to contemporary demographics and climate changes, but their way of thinking about adaptability may still be useful in the search for new forms of adaptability. However, designing new policies using this adaptability only makes sense if new policy paradigms are created in which flexibility is a key value (Scoones, 2009). This could be achieved by more efficiently embedding the specific worldviews of drylands societies in the current policy framework paradigm. The approach presented here takes up this challenge.

2. Method

2.1. Participatory modelling

Faced with the limited impact of scientific knowledge on prevailing drylands policies, experts started using community participation (e.g. Thomas and Twyman, 2004; Pimbert, 2004; Whitfield and Reed, 2012). In recent decades, works have shown that using conventional expert-led indicators of degradation (e.g. percentage cover of palatable perennial grasses) leads to over-simplified assessment of degradation (Thomas and Twyman, 2004; Fraser et al., 2006; Scoones, 2009). It has been increasingly recognised that modelling and participatory approaches can be mutually reinforcing when applied to complex environmental issues (e.g. Giordano et al., 2007; Reed et al., 2008; Voinov and Bousquet, 2010; Dougill et al., 2010). A wide range of participatory modelling approaches exists, from those which incorporate empirical knowledge in a scholar's prior knowledge structure to those which let the stakeholders test the scholar's knowledge, and yet others which focus on eliciting local knowledge (Ozesmi and Ozesmi, 2004; Stringler and Reed, 2007; Reed et al., 2008).

The method described here belongs to the last category. It focuses on how to enable stakeholders to incorporate their own perception of environmental uncertainty and how to deal with it in a simulation. This approach uses role playing games and agent based modelling to ensure a range of different points of view are preserved in the shared modelling of resources management, with outcomes in terms of mutual learning and management innovations (Barreteau et al., 2003; Etienne, 2011).

2.2. "Self design" modelling

Since 1999, we have been working on a particular kind of participatory modelling we call "self-design". "Self-design" means letting participants design their own conceptual framework of issues and goals with no inputs from facilitators, modellers, or scholars' perceptions (d'Aquino et al., 2003; d'Aquino and Bah, 2013). The process has three main stages which specifically focus on letting participants decide on all the crucial elements (Fig. 1):

a) A first "suggesting" meeting. This first meeting is held in many different locations to reach out a wide panel of potential local partners. During the meeting, the participatory simulating approach is presented in detail including a detailed explanation of its objective, i.e. to support people in designing their own land policy views, and of the method, i.e. the self-design of a role playing game and a computerized model. Participants are then asked to contact the team if they are interested in implementing this approach on their own.
b) Next, a "self-eliciting" workshop is held (Fig. 2) with the local partners who re-contacted the team. During this workshop, the participants themselves identify the aims of the process, i.e.: (i) the policy stakes they wish to target (Fig. 2); (ii) the stakeholders they think they will need to take into account in their self-policy design, (iii) the information they think they will need to tackle the policy issues on their own and (iv) the constraints they think could be critical for these issues. Participants are made aware of the level of description they will be asked to provide: i.e. detailed enough to capture their local needs but sufficiently summarized to enable analysis at the national scale.
c) A second participatory workshop is then held during which participants "self-design" their own conceptual model (see Figs. 1 and 2). For this purpose, the outputs of the previous "self eliciting" workshop are structured by the research team into a first simple role-playing game, as a way to let the participants design a conceptual model of their issues.

The settings of this first game are basic but nevertheless very subtle. The challenge is to summarise the major stakeholders' needs and constraints and the main policy stakes they identified in the previous workshop in a qualitative support. First a spatial grid is provided to highlight the simplest environmental typology that can be used without concealing the structural components of the issue (see the example of the landscapes key in Fig. 3). Coloured pawns are provided to represent the different potential uses of each type of landscape, the different colours represent the range of possible activities. Tokens are provided as a way of qualitatively assessing indicators of the major policy stakes. The tokens are removed from the landscape as the players consume the natural resources of the landscape