SIMPARC: COMPUTER SUPPORTED METHODOLOGICAL APPROACH FOR CONSTRUCTING DEMOCRATIC GOVERNANCE IN NATIONAL PARKS MANAGEMENT

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Abstract

We present and discuss the SimParc project, an interdisciplinary project aiming at the development of innovative methodologies, using computer support, to assist collective and cooperative management of national parks. This project represents an international and interdisciplinary partnership towards the building of democratic governance in public policies.

Introduction

Brazil is a biological megadiversity country and, in the context of biodiversity management, one of the main challenges is the construction of social technologies

to support participation process in decision making. This subject became more strategic when Law 9985/2000, that defined the Brazilian National System of Conservation Units (SNUC), was established (Brazil, 2000), in order to regulate and organize protected areas management strategies, considering social participation as a key issue. The country has also recently approved the Strategic National Plan of Protecting Areas (PNAP), that reinforces ethical principles for democratic governance building in public politics for nature conservation (Irving *et al.*, 2006). The question of the integration of the social actors in the management of biodiversity is still largely under discussion in fundamental and applied research fields. It constitutes also a key element for the consolidation of the Convention on Biological Diversity principles.

Recent initiatives to address these challenges in public policies are based on bottom-up participatory approaches that emphasize the role of local actors (stakeholders) and communities. Such bottom-up approaches echo the research conducted by members of the “ComMod” (for Companion Modeling) movement. Over the last ten years, they have developed a participatory method to support negotiation and decision-making in the field of collective management of natural renewable resources. This method consists in jointly using role-playing games involving stakeholders and computer-based agent-based simulations of the environment and associated resources (Barreteau, 2003).

Our project inherits from this tradition. It is named “SimParc” (which stands for “Simulation Participative de Parcs”) and gathers French and Brazilian researchers in an inter-disciplinary approach. It is mainly funded by the ARCUS Program (“Actions en Régions de Coopération Universitaire et Scientifique”) of the French Ministry of Foreign Affairs, Région Ile-de-France, and Brazil.

Objectives

Our objective with this paper is, starting from case studies, to present and discuss the experience of the SimParc project, considering its main research inspiration. Therefore, important questions are: (a) Who are the social actors?; (b) What are their negotiation strategies?; (c) What are the possible conflicts?; (d) What are the political, economic, social and ecological stakes of the conservation of protected areas?; (e) What are the engaged social dynamics?; (f) On what representations and practices are they based?; (g) How to design a management model able to consider the existing conflicts and the possible solutions?; (h) How to envision protected areas management through middle and long term scenarios projections?

To address such issues, we decided to study the use of advanced accompaniment methodologies combining role playing games and simulation (Briot *et al.*, 2007). These approaches, although recent, already proved their potential on a certain number of projects of management of renewable resources (Barreteau, 2003). Their application to the management of protected spaces are a first attempt, with returns awaited on methodology.

Methodology

Since the end of the 1990s, a group of researchers has been developing a participatory approach to support negotiation about collective practices in the context of natural resource management. Gathered within the ComMod movement (standing for “Companion Modelling”), they mostly belong to French agriculture- or development-centered research institutes, such as CIRAD. Their method, called the MAS/RPG approach (Barreteau, 2003), consists in coupling agent-based computer simulations (MAS: Multi-Agent Systems) and role-playing games (RPG) with the concerned actors (stakeholders).

Role-playing games are particularly well suited to foster dialog between actors. The possibility to present via simulation the impact of individual behaviors

on the environment is effective in favoring discussions between skateholders and the emergence of policy proposals. This approach can also help actors gain a broader understanding of a problem, notably by conducting role-playing games where roles are exchanged.

Meanwhile, a main drawback of the traditional joint-use of agent-based simulations and role-playing games is that organizers must be present during the role-playing game and they should manually input the decisions and actions taken by participant. We developed an alternative to the MAS/RPG approach called “agent-based participatory simulations” (Guyot & Honiden, 2006). It consists in further integrating computers into the role playing-game, and can be considered as a merge of the role-playing game and the agent-based simulation. Participants directly access the simulation, using a user interface. All communications between participants take place on the network, as for distributed games, and are recorded, thus subject to automatic analysis. Also, we may insert artificial agents (artificial players or assistants) into the game, as also discussed in (Adamatti *et al.*, 2007).

SimParc project

For our SimParc project, the first concrete case study that allowed the perception of challenges of national park management has been the urban National Park of Tijuca, in Rio de Janeiro, Brazil. It undergoes a real pressure, by urban growth and illegal occupation. This makes the question of the conflicts resolution one of the key issues for the management of the park (Peixoto *et al.*, 2005). The Tijuca National Park has been created as a National Park in 1961, and is a protected area devoted at integral preservation, according to the Brazilian legislation (Brazil, 2006). Examples of inherent conflicts are: irregular occupation, tourism use, water pollution, degradation of the environment, illegal use of natural resources. Examples of social actors involved are: park managers, researchers, traditional or non traditional communities representatives, tourist operators, agencies.

Therefore, the design of our current role playing game has taken inspiration in real cases such as the National Park of Tijuca in order to bring concrete elements to the game, which confers greater applicability to our proposal. However, we chose not to reproduce a real case but to simulate emblematic and illustrative real situations in national parks. To construct the game, the first step was the analysis of real cases and the definition of a conceptual basis. We then designed a first prototype of a role playing game based on the zoning process of the park. We considered 9 potential types of zones, according to legal framework, from more restricted to more flexible ones.

The game has the objective to improve negotiation procedures between the different players, in order to promote cooperative decision. Several roles of different social actors were considered for the game. But at the end of the negotiation phase, the park manager (human or artificial agent) decides the final zoning, based on the results of the negotiation, its viability, and the law.

We first tested our role playing game (without computer support) with researchers of our research group at UFRJ. We are also completing the implementation of its computer support. The computer version offers additional ways to explore and analyze negotiation procedures and a wider range of simulation possibilities. As the computer records all interactions between players, this record can also be automatically processed and used to help participants and organizers better understand the dynamics of the game. Last, some human players may be replaced by artificial agents, as, e.g., in (Adamatti *et al.*, 2007) in order to test strategies, as e.g., for the park manager.

Conclusion

The design of methodologies that contribute to the consolidation of democratic and participatory decision making in nature protection constitutes a

fundamental challenge for national parks management. Therefore, methodological tools able to contribute to dialogue between different social actors and to cooperative decision are essential for the consolidation of the National Conservation Unit System. The SimParc project is a response to these challenges and constitutes an innovative and ludic approach to support negotiation procedures in national parks management, based on the recognition of conflict dynamics involving different interests, roles, and strategies.

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