



Role-playing game developed from a modelling process: A relevant participatory tool for sustainable development? A co-construction experiment in an insular biosphere reserve

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ABSTRACT

This contribution refers to a companion modelling approach applied to the study of interactions between social and environmental dynamics in a small protected island, part of a biosphere reserve. This approach leads to a role-playing game designed by a pluridisciplinary workgroup (researchers and reserve manager), used as management support and as a tool to help people regarding the stakes of sustainable development. For several years, Ushant Island (Brittany, France) was in the process of social and environmental restructuring due to land-use and land-cover changes. Major land-use changes resulted in fallow land encroachment and its consequences on landscape, traditional activities and biodiversity. This situation raises the question as to the different types of actors (stakeholders, scientists, local population) in relation to the future and the consequences of individual actions on common good. The stakes of sustainable development are set. In this study, the transdisciplinary process leads to a geographical agent-based model, simulations and a role-playing game. The role-playing game, final step of our companion modelling approach, is developed in order to assist the awareness raising and the involvement of all, be they elected representatives or not. This contribution describes the steps which led to the role-playing game design, the contents of the play sessions, their results and prospects in terms of learning tools. It examines the place of companion modelling and associated tools in the context of a dialogue, whose main issue remains the following question: “How?”.

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Introduction

While unilaterally set regulations and sanctions were in the past regarded as prevailing in order to protect a natural site, today it appears that such principles are being reconsidered. The concept of sustainable development has become a requisite in our modern society, in which the scope of uncertainty and risk is considerable (Beck, 2001). It symbolises the harmonious bond between man and nature. The first responses to pressure on biodiversity and natural resources consisted in designing reserves. The first reserves were located in the last areas of wilderness, e.g. national parks established in high uninhabited mountains with the aim to protect exceptional scenery and rare and endangered species or habitats (Stolton and Dudley, 1999). Currently, the focus of preservation stakes concerns countryside with extensive human land uses. In

these new areas (regional parks, Man and Biosphere reserves...), protection statuses are globally less restrictive. However, goals are numerous: conservation of high biodiversity levels, ecosystem services, maintenance of a human quality of life, strengthening of a local economy based on nature and culture heritage (Batisse, 1986, 1990). Furthermore, in this way, the social aspect of natural sites, as the outcome of several centuries of anthropisation, is taken into consideration, and the current research challenge is to provide integrated management accommodating competitive uses at times and environmental conservation and sustainability in a changing world (Turner et al., 2007; van der Leeuw et al., 2011; Dearing et al., 2010).

Notions of integration and governance underlie the sustainable development concept, along with the management of common goods based on individual responsibility and cooperation processes. Ongoing evolutions indeed suggest considering a new ruling method (Reed, 2008). In terms of public policy, this involves the transition from a very widely representative democracy to participative forms, which rely on active citizenship through public participation in project designing and therefore the acceptance of

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public policies (Habermas, 1989). As for the sustainability concept, it involves the need for society to consider the future (Meadows et al., 1972).

Reconciling the contentious relationship between biodiversity conservation and human development in protected areas and their surroundings is the current challenge in the context of global changes' impacts on the social and economic fabric and biodiversity (Dearing et al., 2010; Ramankutty et al., 2006). A transdisciplinary approach is a requisite to untangling some associated complexities by integrating ecological and socio-economic aspects for global environmental and sustainability through land change science (Turner et al., 2007). In addition, on the basis of the exclusion of people in management settings, local management requires participatory structures and the integration of local knowledge, needs and interests. However, transdisciplinary research in the environmental and sustainable development field is a real challenge (Pohl and Hirsch Hadorn, 2008) due to the complexity of functional processes, the lack of appropriate methods and scattering of skills and data in a broad subject area and among a number of institutions (Berkes and Folke, 1998). Furthermore, this transdisciplinary research aiming at a contribution to sustainable development not only implies a systemic and cross-disciplinary approach (Wiesmann et al., 2008) yet also the appropriation of knowledge and the acquisition of a common language on behalf of civil society actors (Steyaert et al., 2007). Indeed, the collective action advocated by this concept is not restricted to the scientific circle. It also implies the pursuit of synergy with local management policies and users, and suggests the development and availability of methods and tools likely to be supportive in actions undertaken by the civil society. For considerations to be effective, these actors must be able to access scientific information and incorporate locally accepted knowledge (Johannessen et al., 2001). The access to knowledge implies an appropriation based on learning activities that include individual cultural, collective and environmental factors (Hutchins, 1995). Appropriation may indeed involve different types of audiences since each individual should fully identify with the sustainable development underlying the creation of a common land project.

In carrying out land-use planning, local authorities are encouraged to consult groups and individuals to promote community skills and active citizenship, and to gain insight into possible conflicts or synergies between different options (Golobic and Marusic, 2007; Hessel et al., 2009; Saarikoski et al., 2010). The methodology must therefore integrate an interactive process in which actors with diverging interests gradually build a common representation of reality (Etienne et al., 2003). Within this framework, the knowledge and skills to be acquired and shared not only involve natural and social dynamics but also the means of consultation.

Consultation methods have evolved during recent decades, in part through the exponential advancement in information technology, especially in the use of geographical information technologies (GIT), shown by Malgorzata (2007) as a tool for public participation in urban planning. Many case-studies have demonstrated the value of GIS in the participatory process of integrated land-use planning by supporting local and expert spatial knowledge (Brown, 2006; Hessel et al., 2009). Further approaches are currently being tested, based on collaborative processes in virtual scenario simulations, particularly in coastal areas (Jude, 2008; Jude et al., 2007). In most cases, they rely on geographic information technology (Virtual Reality GIS, visualisation packages) likely to optimise management strategies and public participation in integrated management stakes. With increasing use of the Internet, more and more studies are designing web-based GIS that supports public participation in collaborative planning (Malgorzata, 2007; Simao et al., 2009).

Finalised research initiatives related to the environment in its sustainable development context have been carried out through integrated approaches whose goal is to capture local knowledge and combine it with expert knowledge to stimulate public participation (Golobic and Marusic, 2007). The ComMod network¹ (Collectif ComMod, 2005) advocates a scientific companion modelling position. It considers modelling as an intermediate tool adapted to collective and cross-disciplinary views inhering in renewable resources' management issues and, to a greater extent, in the questioning referring to complex systems (D'Aquino et al., 2002; Collectif ComMod, 2005). Companion modelling connects various circles of actors: scientists, managers, politicians, users, etc., and is based on a number of tools such as multi-agent models (MAS), forecasting scenarios, role-playing games (RPG), etc. (Barreteau and Bousquet, 2001; D'Aquino et al., 2002). In the light of the feedback from this approach, the latter seems to favour learning and mediation (Bousquet and Le Page, 2004; Etienne, 2011), which are fairly new purposes assigned to geographic information technology (GIT), until lately more so assimilated to steering and decision tools. Nonetheless, whatever the status they are allotted (learning, mediation, decision), the involvement of decision-makers and local actors is essential to the success of the setting-up and operational use of these technologies within a sustainable development context (Becu et al., 2008; Houet and Hubert-Moy, 2006).

Our hypothesis is that there are converging interests in the sustainable development concept and public policies regarding the implementation of participative approaches, aiming at socially acceptable management of environments and resources. Such approaches could benefit from GIT successfully applied to land-use planning. This application was motivated by the concern about the current land-cover and land-use changes into a protected coastal area. It aimed to contribute to sustainable land-use planning by the development of a methodology based on participations and interactions between researchers, stakeholders and local communities.

Study site

Part of a biosphere reserve

The study is set in Ushant Island, which is part of the Armorique Natural Regional Park (PNRA), and of the Mer d'Iroise Biosphere Reserve (Fig. 1). In 1979, the island coastline was given the status of "Classified Site", which protects it against any human construction. The UNESCO Man and the Biosphere programme established the biosphere reserves in the 1970s (Batisse, 1986, 1990). Biosphere reserves, representative of the diversity of natural, cultural, economic and environmental conditions, aim at increasing world conservation and facilitating the implementation of international and national planning strategies. Knowledge sharing, research and monitoring, education and training, participatory decision-making are the priorities of the network. The practical implementation of the biosphere reserve concept is particularly based on the pursuit of synergy with local management policies. It corresponds to the availability of tools expected to facilitate fieldwork, with the double aim to favour environmental conservation and the use of land resources for the preservation and well-being of local populations.

Location, demography and land-uses

Ushant Island is located off the western coast of Brittany, France (48°28' N, 5°5'W). Its area covers 1555 hectares. For the past

¹ <http://cormas.cirad.fr/ComMod/en/>.

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