Sustainable development and biodiversity . 2 » Inserts

» Integrated modelling to support concerted Integrated Natural Resource Management (INRM)

Position and background

Biodiversity in exploited ecosystems is directly related to the access and use of renewable resources. Managing these resources therefore relies on the consideration of the intertwined links between cultural and biological diversity. So far however, most research activities have considered exploited ecosystems either as "an ecological system subject to anthropic disturbance" or, alternatively, as "a social system subject to natural constraints". Both approaches have resulted in "command-and-control" oriented management which is now generally seen by many as "being worse than inadequate".

In *Integrated natural resource management* (INRM), the role of the people is central, and human activities can either promote or endanger different types of biodiversity. The challenge is now to develop a new "integrative science for resilience and sustainability" focusing on the interactions between these ecological and social components and taking into account their heterogeneity, scale, and interdependent dynamics. (Such a clear paradigm shift was obvious when the former "Conservation Ecology" journal was renamed "Ecology and Society" in 1997.)

Integrating Natural Resource Management

The relationships between stakeholders dealing with the access and use of renewable resources are at the core of the intertwined ecological and social dynamics driving the changes observed in ecosystems and society. To represent these interactions, there is a need for new simulation models that allow any stakeholders involved (ecosystem and resource managers among others) to gain insights into the challenges they face. These models must be flexible (usable and understandable by diverse participants) and adaptable (easy to modify to accommodate unforeseen situations and new ideas). They must allow the exploration of different alternatives through scenarios simulations. The Montpellier scientific community is involved in using and developing research related to this area (companion modelling, multicriteria analysis, system analysis, etc.). This research does not pledge for prediction, but rather aims at sparking creativity, facilitating discussion, clarifying communication, and contributing to collective understanding of problems and potential solutions.

Companion Modelling

To stress the status change of such simulation models, the term "companion modelling" has been proposed by a network of scientists from CIRAD, CEMAGREF, CNRS, INRA, etc. (see ComMod network). The companion modelling approach has been applied in different contexts in terms of geographical locations (South of France, West Africa) and of the nature of topics treated (understanding biodiversity uses of specific species or of ecosystems; exploring with the stakeholders the issues raised by biodiversity conservation in protected areas; organisation of biosphere reserves or seed systems).

In companion modelling, "Agent-Based Models" (ABMs) are used to represent and simulate the functioning of considered systems. They describe the interactions between micro-level computerized entities.

Several current research activities aim at the representation and perception of the systems to be managed by diverse stakeholders. This is seen as an important step for reaching acceptable solutions. There is also an increasing interest in multi-level agent-based modelling approaches in field experiences. Finally, the effects and impacts of using ABMs, often in association with role-playing games (RPGs), are also being monitored and evaluated to facilitate the collective management of renewable resources.

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>> Scientific Network. ComMod Network (Companion Modelling)

The ComMod network was developed by scientists from CIRAD, CEMAGREF, CNRS, and INRA to design, disseminate and evaluate the use of "companion modelling approach" for integrated natural management (http://commod.org). Biodiversity management is one of the application fields of companion modelling.

This interdisciplinary network now includes 45 researchers from various institutions and Universities from nine countries (Australia, Bhutan, France, Indonesia, Japan, Mexico, Philippines, Thailand, and the Netherlands).

The ComMod Network provides:

- An experimental approach shared by the community of researchers, which aims to cross discipline boundaries, to focus on the interactions between natural systems and societies and to acknowledge their complexity. This approach is developed through role playing games and simulation models to study and tackle integrated natural resource management issues such as decision-making processes, forms of collective action, and the role of representations.
- A free access to simulation platforms (Cormas: http://cormas.cirad.fr).
- Various training courses on companion modelling approach: Training in academic curricula in France and Europe (the Netherlands), in LDCs (Brazil, Thailand); professional training; E-learning via the Ecole Commod Project (http://www.ecole-commod.sc.chula.ac.th/) or the Virtual University of Sustainable Development (UVED).

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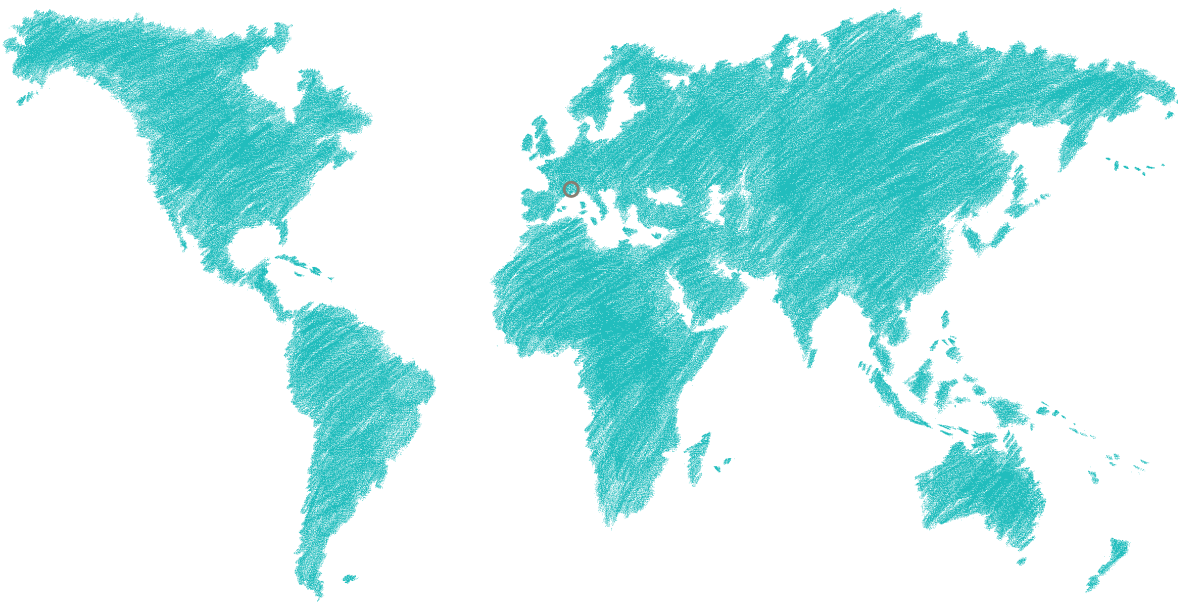

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