



Decision Support System for Sustainable ECOsystem MANAgement in Atlantic Rain Forest Rural Areas

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Recent Activities

ECOMAN is a three-year multi-disciplinary research project that started on 1/1/2002.

In February 2002, a first release of the ECOMAN web site was launched in the World Wide Web.

The first plenary meeting of the project was held in Lisboa on the 2-4 March 2002.

The Methodological Background Report was finished in April 2002.

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Editorial

Tropical rainforests perform a wide variety of functions (ecological, regulatory and productive), which are directly or indirectly valued by humankind. One of the present challenges is to find the most adequate and desirable types of forest exploitation. For that it is necessary to meet the realm of the sustainable development model.

Thirty years after the *United Nations Conference on Human Environment*, held in Stockholm (1972), and of the publication of "*Limits to Growth*" by the Club of Rome; twenty years after the publication of the *United Nations World Charter for Nature* (1982); fifteen years after the publication of "*Our Common Future*" (Brundtland Report, 1987); ten years after the *United Nations Conference on Environment and Development* ("Earth Summit") held in Rio de Janeiro in 1992; and five years after the *Kyoto Protocol* agreements (1997) the world gave some steps towards a rather new way of approaching the issues concerning the development of the nations.

Since the Brundtland Report the expression *sustainable development* has emerged and it has been widely embraced during the last decade, being in this beginning of the 21st century a significant issue of the policies and priorities of many agencies and individuals concerned with the state of our planet and with people's well-being. Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. We may say that it is a vision (a new utopia?) of the future that rejects policies and practices that support current living standards by depleting the productive bases and that aims at integrating the economic growth, the preservation of environmental quality and the promotion of social equity.

Why a project on sustainable management of tropical rainforest areas?

Tropical rainforests are home to a vast biological array of living organisms; they supply a great variety of commercial and non-commercial products; moreover, tropical rainforests are often cited by its natural impact on global climate and flood and erosion control. Deforestation is a problem that affects everyone in the world and until our days the man's impact on the rainforests are resulting from their exploitation. Although the change from practices of exploitation to measures of preservation and, more recently, to different environmental practices of forest resources management, the loss of forest is ongoing.

Therefore, the ECOMAN consortium, made up of five research institutions from European Union, one from Brazil and another from Costa Rica aims at studying and designing some local strategies that could be fruitful to achieve a growth of people's well-being without destroying the remnants of rainforests.

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What is ECOMAN?

ECOMAN, an acronym for Decision Support System for Sustainable **ECO**system **MAN**agement in Atlantic Rain Forest Rural Areas, is a 3-year project, recently financed by the European Commission that addresses the objectives of the Horizontal Programme "Confirming the International Role of Community Research (INCO2)".

Objectives

The general aim of ECOMAN is to produce a management oriented decision support system on interdisciplinary basis to promote a sustainable development of rural areas situated in the tropical rain forests affected by intensive and growing human pressure. The decision support system has to be based on knowledge related both to local and to global levels to improve the socio-economic conditions by the use and protection of natural resources taking into account alternative income and the new market trends at regional and global levels.

Besides the general aim of this project there are 3 specific scientific objectives:

1. To analyse the socio-economic and institutional driving forces that produce land use changes; to identify policies and measures to improve the socio-economic conditions by the use and protection of natural resources taking into account alternative income and the new market trends at regional and global levels;
2. To evaluate the intensity of use of biotic and abiotic natural resources, assessing the ecosystems resilience by using relevant key indicators;
3. To produce an integrated decision support system, involving the decision-makers and stakeholders, capable to simulate scenarios on anthropogenic pressure and ecosystems change.

Phases of the work:

To achieve the objectives of the project, the work plan is articulated in three phases.

1. The first one will carry out an integrated analysis of environmental and socio-economic interactions on selected sensitive areas of Atlantic Rain Forest subjected to intensive anthropogenic pressures.
2. The data collection and the discussions and data integration between partners during this phase will be the basis to design and implement the decision support system of phase two.
3. The third phase will be dedicated to the scenario simulation by involving also administrator's decision and various stakeholders of the study sites.

The research will be developed in Brazil and Costa Rica, where the Atlantic Rain Forest represents one of the clearest examples of sensitive areas where the effects of the increasing anthropogenic pressures have a strong negative impact on ecosystem functionality.

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The project aims at building a decision support system through an integrated approach. Integrate not only the different scientific domains, which are reflected by the arrangement of its research consortium, but also integrate, by their participation, the end users and local stakeholders.

The Atlantic tropical rainforest represents one of the clearest examples of sensitive areas where the effects of the increasing anthropogenic pressures have a strong negative impact on ecosystem functionality

During the course of the project two field areas will be defined in Brazil and Costa Rica for the development of detailed fieldwork by all the teams. These two countries have significant areas with tropical rainforest although subject to enormous pressure resulting from human activities. The rapid deforestation of the 1970s and 1980s resulted in a replacement of the forestry use by other uses, agricultural or not. However, some efforts have been made in the last decades to support the conservation of tropical rainforest, which is reflected in the growth of protected areas, especially in Costa Rica.

Nevertheless, the protection of natural resources in these two countries has implications beyond its borders because they encompass an incredible biodiversity and also because some of the driving forces are situated outside Brazil and Costa Rica, i.e. the international markets for the wood products and for the crops that are replacing the trees (coffee and cocoa).

The ECOMAN Newsletter will be released in paper version at yearly intervals (an electronic version of the newsletter will be released more frequently using the facilities of the ECOMAN web site) and broadly distributed to the international scientific community, disseminating information about the Project's developments and activities and stimulating feedback.

In this issue, the Project and its consortium are presented together with an article about some conceptual issues related with tropical rainforests. For those who are interested in being more informed about the project can refer to the ECOMAN web site and contact details found on the back page.

Sustainable development and environmental changes: how to face ecosystem management?

Nelson Lourenço; Till Harum; Reinhard Lieberei; Alfredo Pérez González; Enrico Feoli; Maria do Rosário Jorge; Carlos Russo Machado

It is well known that the economic growth, which is necessary to face the demographic pressure and to maintain and increase the life standing of the population, has strong impacts on the environment. The environmental changes affect globally and regionally the human system; for instance the decrease of arable lands or the depletion of vegetation and water resources affects both the economic activities and the life conditions of the populations. This framework induces the main question on Global Change research: *How to conciliate the anthropogenic pressures with the sustainability of the environment?*

The growing impacts of human activities on earth and atmosphere at all scales (global, regional and local) justify the emphasis of the central role of mankind in changing the ecosystems. The more recent and faster globalisation process requires, beside a better understanding of the complex interactions between the socio-economic transformations and the environment, efficient tools capable to offer support to decision makers working for the sustainable development. From the ecological point of view these tools are particularly necessary in areas where the human pressure is jeopardising the ecosystem functionality.

To develop a worldwide accepted strategy leading to sustainability of ecosystems against human induced stresses will be one of the great future tasks of mankind requiring intensive research efforts and wise application of the scientific and technical knowledge. The approach chosen for this research project is adequate because it is addressed to develop a methodology for integrating different disciplines with the aim to produce decision-making tools for the sustainable development. The methodology is focused toward an integrated evaluation of sustainability indicators (Moldan B., Billharz S. & Matravers R., 1997) from different environmental and socio-economic perspective

In the chosen sensitive areas of Latin America, the environmental changes are resulting from the economic pressure to face demographic pressure. Those activities, with an impact on natural resources, are largely conditioned by the ecosystems management strategies addressed to the area. However, a partial analysis of their impacts on economy and on nature is excluding a sustainable development perspective. Due to the strong anthropogenic pressure in Atlantic Rain Forest regions there exist a high social, political and economic demand to an integrated management of landscape and water. Accelerated soil erosion is widely recognised as a severe problem in the Tropics (Thomas, 1996; Lal, 1999), affecting not only long established farmland areas but also newly reclaimed forest areas used for agriculture and fast urban and industrial growth.

A review of recent research allows us to say, in spite the fact that many research projects have dealt with the management of ecosystems, which the current proposed approach presents several innovative features in:

- a) Developing an integrated analysis coupling socio-economic and environmental data sets of different spatial and time scales. This approach is more than a multi-disciplinary diagnostic; it aims at developing an interdisciplinary resource capable to maintain high biodiversity levels and to mitigate erosion processes.
- b) Addressing to natural vegetation as one of the most important global indicator of sustainability in rural areas by considering both its importance as a source of traditional and non-traditional income and as the

system protecting the soil from erosion and depletion. The project will integrate the study of vegetation in an interdisciplinary context using the tools of system theory.

- c) Addressing to the soil erosion study to evaluate appropriate farm-level adaptive responses and prospects for sustainability, as well as the building of rehabilitation strategies, oriented to sensitive areas with increasing anthropogenic pressures. Recent studies on the identification of hot-spots of erosion-induced soil degradation (Scherr & Yadav, 1996), include several regions on tropical Africa, Asia and most of all of Southern and Central America, namely along the fragile ecosystem of the Atlantic Rain Forest (Blaschke et al., 2000).
- d) Analysing the interactions nature / society based on advanced methods in linking decision support systems with GIS technology to promote alternative income generation from the use and management of natural resources including their protection.
- e) Involving the stakeholders since the beginning of the research. This will bring formal analyses together with judgments and thus it will better meet the needs of decision-making participants. Starting from real needs raised by the local stakeholders (private and public) the research will have a problem solving approach.
- f) Developing integrated and prospective scenarios at different levels (from local to regional) to understand the dynamics, to propose management strategies based on sustainability indicators (Moldan B., Billharz S. & Matravers R., 1997). These scenarios will be open to include feedback processes coming out from the different socio-economic actors.

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