Interdisciplinary support tool for decision makers in the Atlantic Forest of southern Brazil

Peralta Agudelo, Libia Patricia[1]

Abstract

The Atlantic Forest covered the length of the Brazilian coastline in the 19th century while it is estimated that today only 5% of its original cover remains in the form of scattered fragments. Nonetheless, it is considered one of the global hotspots for biodiversity conservation being one of the most environmentally sensitive areas worldwide. The biggest continuous fragment of that biome is contained in the Environmental Protection Area (EPA) of Guaraqueçaba in the State of Paraná, southern Brazil. The EPA was declared a Global Biosphere Reserve by UNESCO in 1991.

The Paraná state (200,000 km2) has lost more than 90 percent of its forest cover in the last 50 years. The implementation of conservation units such as the EPA of Guaraqueçaba do represent an important step forward towards forest conservation in Brazil since they provide a legal basis to enforce preservation and a scientific perspective to understand the complex social and ecological aspects that interact in such areas.

It has been nevertheless pointed out that agencies that are in charge of monitoring and protecting the EPA of Guaraqueçaba have not been successful in preserving the integrity and biodiversity of the region due to: (i) lack of adequate training and methodology of data management and collection. (ii) local communities´ culture and dynamics were disregarded when delimiting conservation units resulting in increasing social and ecological conflicts in the region. (iii) poor coordination between agencies in charge of environmental protection.

The project aim was to develop an information tool to support decision makers both in understanding the interdisciplinary processes that lead to forest fragmentation in the Atlantic Forest and the adequate manner of collecting, storing and analysing relevant data. With that aim, the proposed study was conducted in two phases. Firstly, considerable effort was devoted to identify the main stakeholders and decision makers in the Guaraquecaba situation in order to assess their information needs. Secondly, a Geographical Information System (SIG) was used to integrate and analyse the most relevant ecological and social factors interacting in the region.

Phase 1. The mapping of main stakeholders attributions and interests

A systems approach was designed to 'map' the main stakeholders' responsibilities, attributions and fields of action. In the case of Guaraqueçaba, three main types of stakeholders were considered: i. governmental agencies such as IBAMA, the National Environmental Agency and SEEC, the Natural Heritage State Programme. ii. the academic sector represented by Universities, NGOs and research institutions and iii. society represented by tourists and the local communities of Guaraqueçaba. Through interviews and questionnaires, their general, common and specific needs were established. The use of a conceptual systems approach was essential to understand how these stakeholders may exchange information with each other when managing, monitoring, preserving and exploiting the Guaraqueçaba region. This ´mapping´ effort helped also to identify overlapping and individual interests, as well as to define which environmental information would be relevant to consider in order to design an interdisciplinary decision support tool. It was a common understanding that the aim was not to produce a vast database, but rather to delimit what kind of data would contribute significantly to establish an efficient dialogue between stakeholders. It was called 'strategic' data for preservation.

[1] PPGTE, Postgraduate Programe in Technology, CEFET-PR, Federal Centre for Technological Education of Paraná, Avenida 7 de Setembro 3165, 80230-901, Curitiba,Paraná. E-mail: pperalta@ppgte.cefetpr.br.

Phase 2. The integration of 'strategic' social and ecological data for preservation

Due to time limitations the study focused on some pilot areas such as Honey and Peças Islands located in the estuarine complex of Guaraqueçaba. During the study, it became evident that main conflicts to manage Guaraqueçaba aroused primarily because of lack of communication between main stakeholders. In that sense, it was clear that although each one was moved by their own attributions and interests, none had a clear understanding on those of others. In that sense, the study was conducted towards finding the kind of information that would be useful to illustrate the various ecological and social interests that generate conflicts in the region. It was also established that the main conflicts had a common spatial characteristic motivated by access to natural resources. Therefore, conflicts had a clear ecological, social and economic background. To achieve this required interdisciplinarity, the use of a landscape ecology and conservation biology approach was adopted. In that sense, main data was gathered on the spatial, structural and functional properties of the observed landscape of Guaraqueçaba. Data was integrated using remote sensing and a Brazilian GIS platform called SPRING. Main aspects considered the mapping of deforestation patterns and fragmentation effects.

In order to integrate the local social aspects into the study, 'community resource mapping' techniques were developed through the mapping of forest trails and the spatial analysis of main types of economic and social activities in the region. Studies that analysed urban expansion and bird populations dispersal were also introduced into the analysis. For that, cooperation agreements with some local research institutions was established. The idea was to create an interdisciplinary group of specialists that assisted in the introduction and interpretation of data.

These variables were integrated into the GIS using a qualitative model, based on variables such as Low, Moderate and High impact activities amongst others.

The resulting data helped both to understand how local communities are currently interacting with their local environment regardless the existence of the nearby conservation units and to identify areas where monitoring and law-enforcement resources should primarily be devoted. It is also considered that important spatial aspects that were previously disregarded such as the need for community expansion areas and leisure were clearly defined.

Conclusions

Phase 3. Dialogue expansion

Although the study has already produced interesting results, it is considered that these should be made easily available to main decision makers, especially those at Governmental level. Although GIS is used by main governmental agencies in Brazil, main decision makers at management level are not necessarily familiar with manipulating these systems. For that reason, results are expected to be made freely available through the WWW to all interested. It is strongly believed that in order to make results useful, data and maps should be presented in a easy to transport graphic format and should provide a basis to discussion and interaction between main stakeholders. This is considered to be Phase 3 of the project and is currently underway being the theme of two Masters degrees at the Federal Centre of Technological Education in CEFET Paraná. In that phase, aspects such Knowledge Management, Database Architecture, Intelligent Agents and Distance Education techniques are being analysed.