

# Chapter 10

## Coupling Geographic Information System (GIS) and Multi-Criteria Analysis (MCA) for Modelling the Ecological Continuum in Participative Territorial Planning

**Mireille Batton-Hubert**

*Ecole Nationale Supérieure des Mines de Saint-Etienne, France*

**Pierre-Olivier Mazagol**

*Université Jean Monnet, France*

**Marie Bonneville**

*IPAMAC, France*

**Frédéric Paron**

*Ecole Nationale Supérieure des Mines de Saint-Etienne, France*

**Thierry Joliveau**

*Université Jean Monnet, France*

### ABSTRACT

*This paper presents a research experiment that started in 2007 on the French “blue and green infrastructures.” At the prompting of a French local administration, this experiment takes into account ecological stakes and involves actors in territorial planning at a metropolitan scale. Founded on previous works, the goal of the approach builds a participative workshop based on GIS and MCA coupling in order to think collectively and better understand the initial foundation of the method, the problems and proposed solutions, and the theoretical and the practical prerequisites. The final goal suggests methodological solutions to facilitate its generalization and its diffusion. The objectives are: (1) to analyse as objectively as possible the initial approach, methodological and technical choices, constraints, limits, and potential improvements; (2) to take into account questioning about the participative workshop conception and functioning; (3) to test new methodological proposals.*

DOI: 10.4018/978-1-4666-0333-2.ch010

## INTRODUCTION

Taking into account the natural environment and landscape in territorial planning is often done formally in compiling preparatory documents concerning the territory in question. Then, these documents are discussed and negotiated with multiple committees for development activities regarding environmental and landscape viewing objectives. The approach of BGI (Blue and Green Infrastructures, IVB in French) is interesting for its willingness to rely on the scientific basis of landscape ecology and to use data and tools for digital geodata cartographic representation of the criteria to be taken into account in the decision-making process. This approach is also thought to be participative. It combines government services, public bodies, and local actors in a steering committee. Even if the doctrine of the State on biodiversity, landscape, and amenity for local planning is to be applied, this State doctrine seeks to elaborate a collaborative fashion, involving several areas of expertise. The BGI approach seems a good example for developing a meaningful discussion on the issue of environmental planning of the territory in a collaborative or participatory sense. This mapping process, based on numerical processing, provides “a consistent picture of the territory” which aims to provide easy viewing of the stakes involved and to challenge all the actors. This approach should be used before any development projects as it provides awareness of the ecological and landscape stakes of a territory. Finally, the availability of tools is designed to facilitate the ownership of the method by other research teams to allow its implementation in other areas. The BGI approach should be considered as a consistent spatial information method conducted collaboratively to formalize territorial stakes related to natural environments, landscapes, and natural modes of movement of animal and human communities.

The objectives of this paper are the following: (1) to analyse as objectively as possible the initial

approach along with the associated methodological and technical choices, constraints, limits, and potential improvements; (2) to take into account questions related to the participative workshop conception and functioning; (3) to test new methodological proposals.

This approach involves three restraints: (1) *scientific constraints*, because the method needs to develop its prescriptive approach, based on principles of scientific explanation; (2) *organizational constraints*, because the application is done with the data, tools, and skills available in the State services, complemented by those of research consultancy; (3) finally, *socio-political constraints*, because the results obtained by the method must be followed by an approach to study and confirm the results and to define the strategy of the State according to documents, planning, and projects.

Our approach offers an original device at the interface of research (to produce new knowledge) and action (to develop methods and tools used in situations). Faced with a request from a State service, the local offices of the Ministry of Territorial Planning of the Loire department, to improve a method integrating an ecological dimension in a spatial planning process, we chose to respond not by expertise but by building a workshop implementation of the method, tested in the form of role playing in training contexts.

We made the assumption that this approach offered several advantages. First, it allowed the research team to quickly apprehend the method and also the constraints of its application in a simplified case, inspired nevertheless by the real situation. Furthermore, inviting users of the method to participate in the workshop facilitated the implementation of the new approach proposed. Finally, the comments of workshop participants allowed potential problems that the method could cause to be revealed.

This work led to the establishment of a training workshop/research implementing the method as a role playing game. It has been tested with

21 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/coupling-geographic-information-system-gis/63761](http://www.igi-global.com/chapter/coupling-geographic-information-system-gis/63761)

## Related Content

---

### Vegetation Filters: The Potential of Short Rotation Woody Crops for the Treatment of Municipal Wastewater

Mohini Singhand R.K. Srivastava (2015). *Handbook of Research on Uncovering New Methods for Ecosystem Management through Bioremediation* (pp. 196-221).

[www.irma-international.org/chapter/vegetation-filters/135096](http://www.irma-international.org/chapter/vegetation-filters/135096)

### Does Economic Crisis Force to Consumption Changes Regarding Fruits and Vegetables?

George Vlontzos, Marie Noelle Duquenne, Rainer Haasand Panos M. Pardalos (2017). *International Journal of Agricultural and Environmental Information Systems* (pp. 41-48).

[www.irma-international.org/article/does-economic-crisis-force-to-consumption-changes-regarding-fruits-and-vegetables/176437](http://www.irma-international.org/article/does-economic-crisis-force-to-consumption-changes-regarding-fruits-and-vegetables/176437)

### Representations of Topological Relations Between Simple Regions in Description Logics: From Formalization to Consistency Checking

Catherine Roussey, François Pinetand Michel Schneider (2013). *International Journal of Agricultural and Environmental Information Systems* (pp. 50-69).

[www.irma-international.org/article/representations-topological-relations-between-simple/78158](http://www.irma-international.org/article/representations-topological-relations-between-simple/78158)

### Exploring Information Technology and Total Quality Management Implementation by Food and Drink Manufacturing Enterprises

Sofia Zioupou, Basil Manos, Zacharoula Andreopoulouand Irini Tzimitra-Kalogianni (2019). *International Journal of Agricultural and Environmental Information Systems* (pp. 1-13).

[www.irma-international.org/article/exploring-information-technology-and-total-quality-management-implementation-by-food-and-drink-manufacturing-enterprises/228925](http://www.irma-international.org/article/exploring-information-technology-and-total-quality-management-implementation-by-food-and-drink-manufacturing-enterprises/228925)

### Integrated Sustainable Urban Infrastructure Management

Benson Au-Yeung, Tan Yigitcanlarand Severine Mayere (2011). *Green Technologies: Concepts, Methodologies, Tools and Applications* (pp. 902-919).

[www.irma-international.org/chapter/integrated-sustainable-urban-infrastructure-management/51738](http://www.irma-international.org/chapter/integrated-sustainable-urban-infrastructure-management/51738)