A GREENWAY REGIONAL NETWORK

A Schematic Vision for the Metropolitan Area of Lisbon (AML)

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ABSTRACT

This paper presents a synthesis of research focused on a territory of about 3000 km^2 covering the present Metropolitan Area of Lisbon. The research has no binding authority. It is intended to emphasise the importance of permanent, continuous research that is conducted in parallel with the respective governmental planning agencies, and also for the need to have prospective visions that may become long term strategic goals and policies. We also want to emphasise that information technologies are essential tools to support a multipurpose information system. The paper describes some economic and demographic characteristics, natural and cultural values and the tendencies of some of the important variables. We advance some very basic ideas for greenways network of protected area forming a mosaic of large and small nodes linked with corridors, and managed for multiple purposes.

KEYWORDS: Geographical Information Systems (GIS), Greenways, Metropolitan Area of Lisbon (AML), Regional Planning.

INTRODUCTION

When analysing an Metropolitan Area like Lisbon, which is experiencing very rapid urban expansion, some fundamental questions arise that have to be answered before any planning or political actions are taken:

- What model of a Metropolis do we want to leave for future generations?
- What are the values and intentions that this model expresses?
- Which plans and programs should be settled to implement the model?
- How to start with the necessary means and which agents will carry out these actions?

These questions have an essentially political nature that determines the response to the choice of different alternatives. In synthesis, these represent the persistence of present trends, the acceptance of a more desirable model or the choice of an intermediary one, that is a compromise between the two first scenarios presented later.

It is certainly easy to obtain a broad consensus about the very general aims, as the need to strengthen the economic basis of the cities, or the need to increase the quality of the urban environment, or also that a democratic regime intensifies the public participation in decision making. The difficulties arise when one must make decisions about the projects which will realise these aims, objectives and programs and define the rights and duties of the numerous agents involved.

Environmental or landscape planning is in fact very complex, since it depends on a group of activities of a multi-disciplinary nature with simultaneous political, scientific and technical considerations. Overlaying all of these are the larger ethical questions asked above.

To deal with this complexity we can learn from history, in particular by the very courageous decisions taken against the negative effects of the ongoing industrial age in the last century. Stronger pressures are now causing even more serious effects. However, we now have available numerous more recent theoretical and political contributions, such as the case of the United Nations Rio de Janeiro Conference that makes the concepts of Development and Environment irreversibly inseparable.

We must also consider the new knowledge, namely from the application of sciences including biology, and ecology that imply a rethinking of former planning practices and that are contributing to the new rules of ecological planning [11][4][1]. At last, we must mention the prodigious technological means that are now offered by the new information technologies and that finally allow the application of a continuous updating of supporting the established premise the "planning is a process, not a product" .

This complexity does not exclude the need for creative capacities. The emergent role of planners is exactly to define the problems, particularly the long term ones, and by the constant use of permanent and updated information with a creative reflection, to discover visions of synthesis that can pave the way to more favourable future alternatives [3].

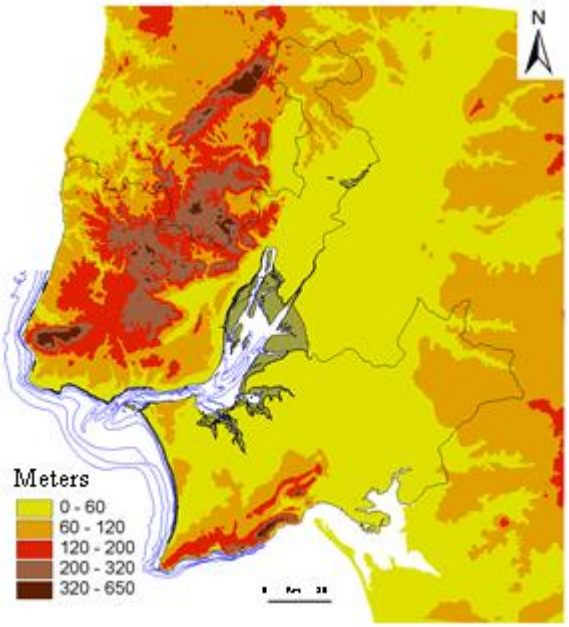
These are the main ideas that formed the background of this research program.

THE LISBON METROPOLITAN AREA

In Portugal the vast majority of the human activities, and consequently the higher population densities, are concentrated along the coast. Such is the case of the AML (fig. 1 and 2), with 27% of the total Portuguese population (2 540 276 inhabitants) distributed by an area of 3 070 square kilometers, which spreads along an extensive Atlantic coastal line and two important estuaries – Tagus and Sado.

This growth of the coastal areas leads to industrial and urban pressures that contribute to an unbalanced occupation of the land as well as rising contamination problems. Therefore, there's an urgent need for a proper management on the AML, aiming not only the correction of the present problems but also the protection of sensible areas that still enjoy an ecological balance.

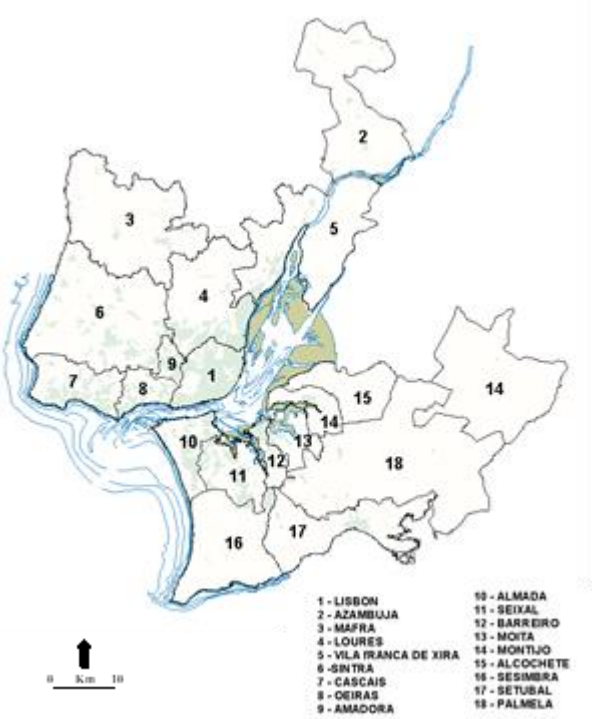
Figure 1. AML Hipsography (SMIG/AML)



During the sixties and seventies an exponential demographic growth in AML has caused a progressive urban degradation in the territory, particularly in the coastal areas. Chaotic urban settlement and declining agricultural uses led to landscape and natural resources degradation and suburban life quality decrease. In fact few initiatives, aiming the regional planning, have been implemented.

In the eighties and nineties, a new political, economical and cultural view started to invert these processes. Aware of the importance taken by damaged areas recovering, national and local authorities initiated a process for recovering and protecting the territory.

Figure 2. AML Municipalities (SMIG/AML)



THE CONCEPT OF GREENWAYS NETWORKS AND THE URBAN SPREAD

As part of an international movement, the concept of Greenways was born to answer the dilemma of modern society: to mitigate the negative effects of economic development, and to protect existing environmental qualities in a strategic manner, by concentrating on areas of resource concentration. .

In fact, in the regions of greater concentration, if the urban spread is not controlled by a clear structure of protected areas, it runs the risk of destroying in its passage the resources indispensable to a sustainable development - a fundamental aim insistently recommended by many national and international organisations. Only then will be possible to secure the quality of life, or even, according to some, to secure the survival of future generations.

The movement that created Parks and Reserves started in the XIX century in the USA, to answer the emergence of great demographic concentrations in cities. But in face of the constant growth of the population and of the mobility made possible by an improvement of transport, the spread of the urban areas continued to take place. Metropolis were formed and later Megalopolis. In the face of such large scale and widespread urbanisation, Parks and Reserves were no longer considered sufficient to meet the needs of an increasingly urban society.

It became necessary to create the concept of "Greenway Networks". This is a concept capable of simultaneously finding answers to multiple concerns: concerns with the defence of natural and built values in areas under very strong pressures of urban growth; concerns in the

attractive areas for appropriate tourism and recreation, concerns of a preventive nature, to protect the quality of the air, the soil, the water and the living resources, trying to avoid very expensive emergency and recovery, through artificial and complex solutions. Greenways offer a strategy to answer these concerns.

The concept of Greenways has been defined as linear open spaces along natural corridors, as coastal fronts, waterways and ridges linking between them big and small spaces, as natural reserves, historic sites and elements of the cultural heritage, including classified urban settlements [5].

Greenway Networks thus seek to establish, on the one hand, a safeguard for the values and potentialities either built or natural. On the other hand, they try to establish use restrictions in places where there are great risks of severe accidents. Greenways include the defence of remarkable buildings, the regulation of areas in which waterways exist that must be kept unpolluted, the keeping of habitats suitable for species necessary for the economy and for the balance in nature, as well as to the migrations of those species. One also considers the regulation of areas submitted to floods, erosion, collapse, desertification, earthquakes, etc.

The concept of Greenway Networks does not enter into conflict with the concepts of Ecological Reserve (REN) (fig. 3) and Agricultural Reserve (RAN) (fig.4) already institutionalised in the Portuguese legislation. These three concepts, on the contrary, mutually support and complete themselves.

It is important to emphasise the universal trend for urban populations to abandon central cities in pursuit of more favourable environments in the suburbs. At the same time important economic links with the cities are maintained. This tendency supports the need to pursue a regional view on these issues, the city and its hinterland are increasingly a single entity integrated in a dynamic of economic and physical change.

Figure 3. National Ecological Reserve (SMIG/AML)

Figure 4. National Agricultural Reserve (SMIG/AML)

AIMS AND DESCRIPTION OF THE RESEARCH

The aims of the research were double. In the first place, the project tried to contribute to improve alternative solutions for the Greenways Network. One tried to demonstrate that there are many strong reasons that lead to the creation of Greenways and that, simultaneously, there are still many values or indispensable resources, like underground waters, that will support the creation of Greenways networks for the AML.

We assume that the application of the Greenways concept relying on Geographic Information Systems (GIS),

constitutes an urgent experiment within the framework of a new management for the whole AML.
The second aim to pursue was the implementation of a GIS with some fundamental requirements:

• A trustworthy system in which the main environmental, social and economic issues can be represented and geo-referenced;

• An accurate system answering to the relevant requirements of the cartographic sciences and technologies;

• A dynamic system that can be economically updated, without complete reconstruction as traditionally required.

• A useful system for Local Authorities and all other public and private institutions concerned with the AML local and regional planning and management.

• An open and interactive system integrated in a national information network;

• An operating and simulating system that can develop alternative futures to be clearly presented to decision-makers.

At a first stage the data necessary to build a more detailed and accurate database was collected. It was overlaid on the basic platform that is the 1:25 000 topographic sheets covering the AML. This topographic digital basic data was obtained from the producer, the Portuguese Army Cartographic Institute (IGeoE). It includes 44 quad sheets each representing an area of 16 x 10 km.

The main spatial data for the Metropolitan Area of Lisbon Concept Greenway Plan is the following:
Basic Cartography
Instituto Geográfico do Exercito (IGeoE)
1:25 000 scale
Hidrography
Coastlines
Hipsography

All the other graphic information was overlaid on this data platform. Only a small part of it was available in digital format.

Portuguese Geologic Mapping
Source : Serviços Geológicos e Mineiros (SGM).
Three great groups of geologic features stood out: the alluvions, the sands, limestone's, the granites and gabbros.

AML Regional Master Plan (PROTAML). 1992 (fig. 5)
Source : Comissão de Coordenação da Região de Lisboa e Vale do Tejo (CCRLVT).

This Regional Plan contains many inventory data. Beyond the text and numeric data, the following graphic data was particularly useful: Protected Areas, Cultural Heritage, Buffers (related to artificial factors limiting development, like military grounds), Major Roads Network, Urban Areas in 1970 and Urban Areas in 1990.

Population Census 1991
Source: National Statistical Institute (INE)
The geo-referenced statistical data concerning many demographic, social and economic variables including the 1960-1991 demographic variation of all the AML 18 Municipalities were studied.

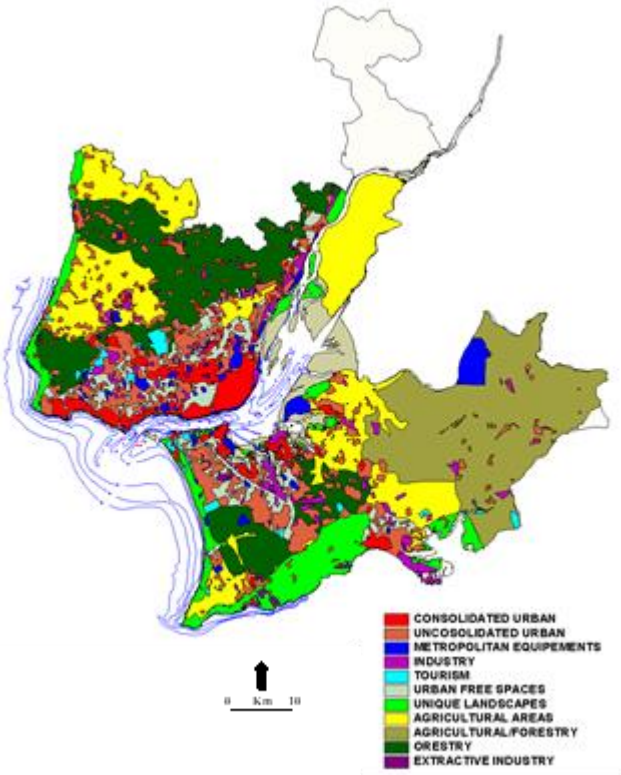


Figure 5. AML Regional Master Plan (SMIG/AML)

Historic and Cultural Heritage
Sources: AML Regional Master Plan (PROTAML)
Field surveys and work in Libraries
Patrimony Departments of the Municipalities

About 5000 elements were identified with the co-operation of the AML Municipalities [9].

Municipal Master Plans (fig. 6)
The most important data provided by the 18 Municipal Master Plans (PDMs) of the AML was digitised. The method that was developed and applied in our research enables the individual PDM´s to be merged into a single spatial database, with the aim of obtaining a regional overview. One example of spatial analysis shows how the spatial application of two legal requirements, the "National Ecological Reserve" and the "National Agricultural Reserve" were put together to perform a regional overview over the AML. [7].

Figure 6. AML Municipal Master Plans (SMIG/AML)

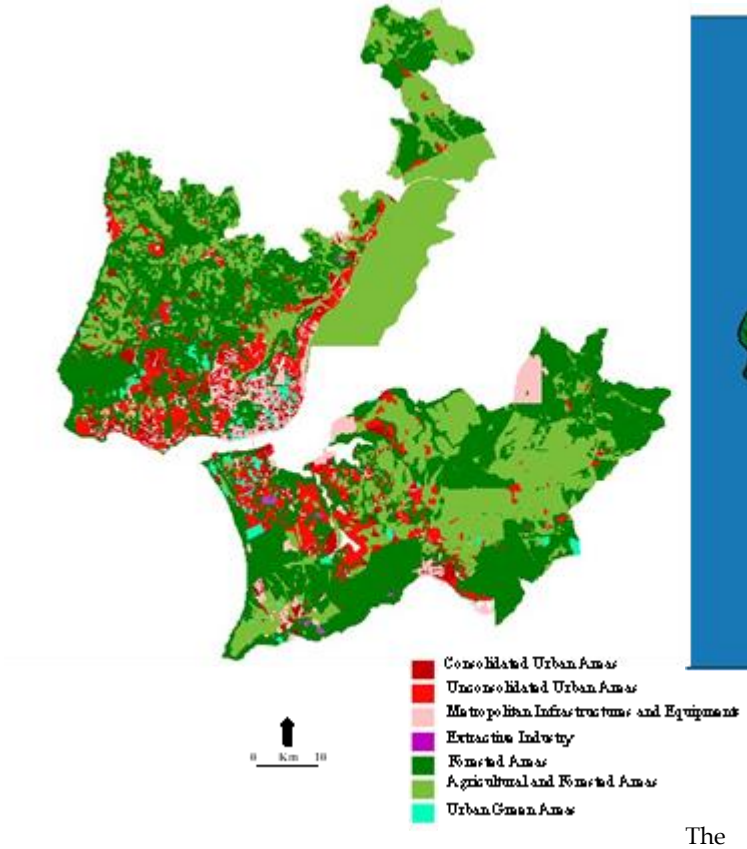
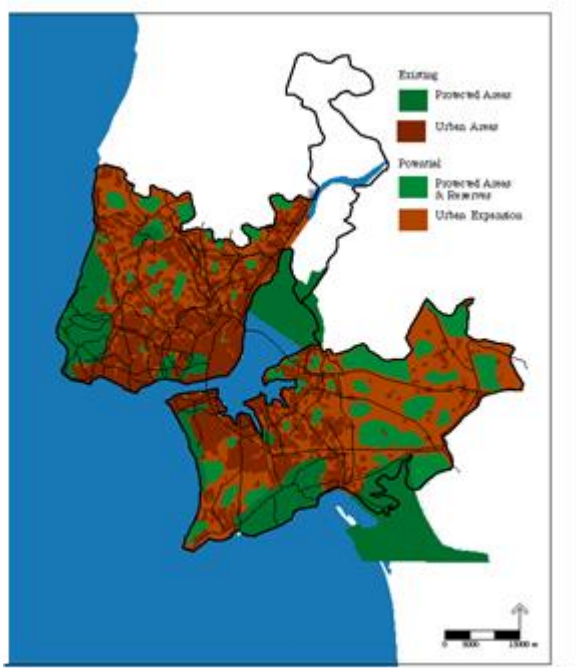


Figure 7. Trends Scenario (AHERN, 1997)



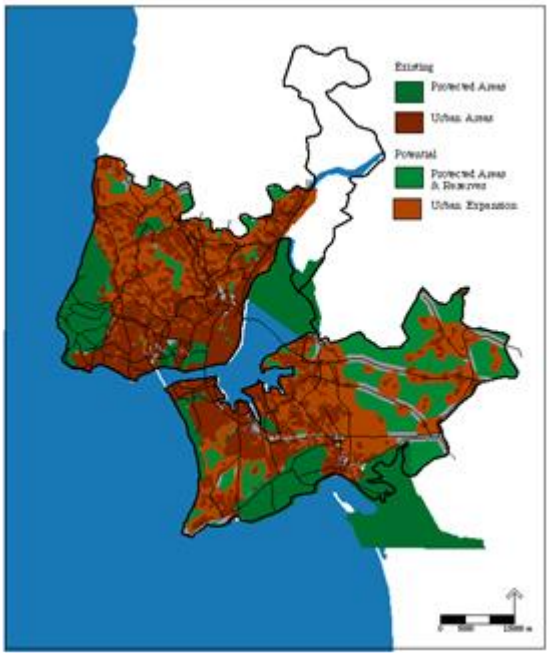
THE SCENARIOS

In response to the need for a Greenway Vision for the AML, three scenarios were developed for discussion. These scenarios are simplified regional visions of alternative futures. One is based on a projection of existing trends, the others attempt to illustrate alternative strategies for determining future urban form in the AML. For a more complete discussion and illustration of these scenarios, please see Ahern [2].

The *Trend Scenario* (fig. 7) illustrates a "worst case" future in which urbanisation expands to fill the voids around the presently protected areas. The scenario assumes that existing or proposed areas for ecological reserves (REN) and agricultural reserves (RAN) will overwhelmed by urban expansion. Major negative impacts occur on broad scale resources, generally hydrological and biological, particularly for groundwater resources in the South Bank. There is little chance for recovery if the wildlife habitats are lost, and the aquifers are polluted. Recreation and tourism resources will also be degraded in this scenario.

The *Urban Framework-Green Islands Scenario* (fig. 8) illustrates a possible future in which continued development of highway "channels" future development into growth corridors. A protective strategy is then applied to select resource areas, which become "green islands" within the urban framework.

Figure 8. Green Islands Scenario (AHERN, 1997)



This scenario also assumes that the present REN and RAN will be compromised by urban spread. The "Green Islands" can provide local access for recreation, but fail to support regional scale processes such as groundwater resources, flood protection, and wildlife habitat.

The *Greenway Scenario* (fig. 9) presents the most ambitious vision for the future of the AML. In this scenario a strong, green framework is established. Following existing proposals for REN and RAN, and key resources. The scenario notes several fundamental changes needed regarding greater public awareness, co-operation, and planning.

RESULTS AND DISCUSSION

The aims of this research have a dynamic character according an ever-changing real world, imposing challenges and opportunities. However, concerning our Greenway project a question must be answered. What are the aims that were achieved in three years of work? How have the earlier results been advanced?

The answer can be given accordingly:

a)The former results – the 1994 conceptual plan and database –were broadly disseminated at scientific meetings, journals and conferences in Portugal and abroad. International dialogue with academic and public representation was expanded at municipal, national and international levels.

b) The database was expanded and improved as a framework for participatory long range planning. The great gaps were analysed in a more detailed approach. New natural and cultural nodes to be protected and linear links between new and already protected areas are proposed.

c) All the requirements of cartographic science and technology were fulfilled, namely, in the complex task of the analogue-digital conversion of many of the 18 AML Municipal Master Plans. A maximum positioning error of 3.0 to 5.0 meters was respected.

d) Graphic databases started to be linked to alphanumeric databases using Access and Oracle software.

e) The usefulness of the completed work is being demonstrated. Information, software, hardware and trained members of the Work Team are now settled in the AML Administration Headquarters, co-operating in the installation of a regional Geographic Information System for the Metropolitan Area of Lisbon. This decision was taken according a Protocol signed between CNIG and AML in the scope of the Portuguese Network for Geographic Information (PROSIG).

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A GREENWAY REGIONAL NETWORK

A SCHEMATIC VISION FOR THE METROPOLITAN AREA OF LISBON

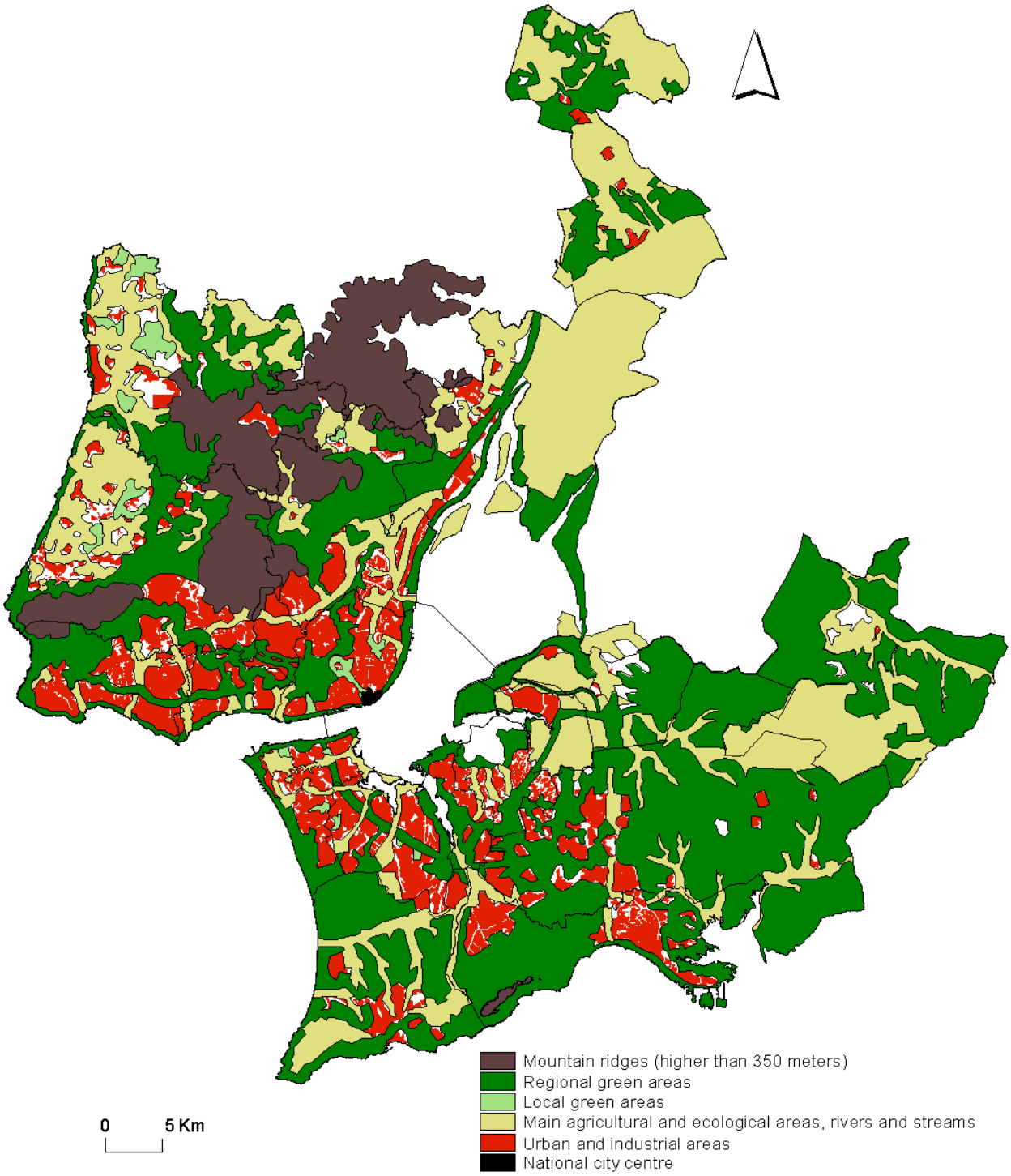

Figure 9. Greenways Scenario

AML

CNIG

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