

Decision making in Integrated Environmental Management of Functional Urban Areas: tools and methods applied within a European cooperation programme

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Abstract

Within the ongoing LUMAT cooperation project (<https://www.interreg-central.eu/Content.Node/LUMAT.html>), financed by the Interreg Central Europe programme, including 7 countries, the Italian pilot area involves 22 municipalities of the Metropolitan City of Turin working together in order to define a management structure of Homogeneous Zone n.11 (HZ #11) of Turin Functional Urban Area (FUA).

Through a series of workshops, the municipalities were involved and trained for building a shared Functional Urban Area identity, evaluating their Ecosystem Services, managing their land use conflicts and involving citizens in all spatial decision-making processes. This cooperation brought, in each participating country, to the construction of an Action Plan for the definition of the Integrated Environmental Management Strategies for the Functional Urban Areas.

In this context, the Italian FUA agreed on the use of a tool for facilitating the decision-making processes in a complex environment such as the inter-municipal agglomeration. Thus, the representatives of the municipalities were supported in the definition of a common and shared data platform through the use of the Interactive Visualisation Tool (InViTo), a web based mapping tool developed by SiTI. Through the visualization of thematic maps, municipalities can discover how the territory can develop territorial resilience to specific large scale projects, thus providing important information to decision and policy makers before the approval of design or funding.

The paper discusses the method built for the project development, from the involvement of Public Administrations to the implementation of the strategy described in the Action Plan.

1. Introduction

Urban systems are scientifically demonstrated to be a main actor in the global climate change (UN-HABITAT, 2011; Hsu et al., 2018a, 2018b). Energy consumption, land use, waste of water, air, noise and light pollution are just some of the effects generated by human activities. As urban population is constantly increasing, the urgency of a new approach in the organization and functional dynamics of urban agglomerations is evident (Bansard, Pattberg & Widerberg, 2017; Estrada, Wouter Botzen & Tol 2017; Melis, Masala & Tabasso, 2015; Vidalenc, Rivière & Theys, 2014).

Different initiatives such as the Covenant of Mayors, C40, or the Cities for Climate Protection program (CCP) establish their basis for activities against climate change on a diffused network between cities (C40 CITIES, 2005; Covenant of Mayors Office, 2008). In Europe, other kinds of partnerships between cities is possible through the cooperation and participation in EU project and programmes such as Horizon 2020 (<http://ec.europa.eu/programmes/horizon2020/>), LIFE (<http://ec.europa.eu/environment/life/>), Interreg (www.interregeurope.eu/), and several other programmes. All these initiatives include specific calls for promoting sustainable approaches in re-thinking European cities. In particular, many programmes focus on finding new methodologies for renewing long-standing settlements, as the many European historical cities are, in order to make them sustainable and resilient to present and future changes.

A common problem for many European cities due to the presence of industrial areas grown during the last two centuries which are partly abandoned in the last decades and partly obsolete and resource consuming, thus showing an inappropriate infrastructure in size, technologies and sustainability. Most of them has a big impact on territory, both environmentally and economically, thus affecting different municipalities and the its whole functional economic unit, namely the Functional Urban Area (FUA), as defined by OECD, 2013.

In order to deal with the lack of cooperation between municipalities and overcome the problem related to the management of the territory, the Interreg Central Europe programme promotes the construction of projects dedicated to the management of natural resources for sustainable growth. The aim of this kind of programs is to promote the cooperation among countries aimed at improving an integrated environmental management of FUAs “to make them more liveable places”.

In this context, the paper describes the experience within LUMAT, a cooperation programme financed within the Interreg Central Europe programme, dedicated to the definition of sustainable land use and integrated environmental management in seven FUAs of Central Europe.

2. The LUMAT methodology

The project’s objective is the implementation of Sustainable Land Use and pilot projects in Integrated Environmental Management in 7 Central European Functional Urban Areas. The LUMAT partnership involves cities, regions, environmental agencies and research institutions aimed at developing integrated "Functional Areas Management Strategies (FAMS)" with shared transnational territorial and scientific competence. FAMS include planning strategies supported by innovative technologies. Based on a common strategy and through the use of new interactive information tools, local partners involved local stakeholders in the definition of local action plans and pilot/demonstration projects for land and soil including information base and tool for the management of urban-peri-urban relationships.

Tools on FAMS methodology and participation become integrative part of FAMS to get more liveable places starting with the pilots in all regions. The focus of the project is on successful brownfield redevelopment, green infrastructure, and sustainable land use on contaminated land.

In Italy, FUAs identified by OECD (2013) are not institutionalized. Nevertheless, the OECD’s FUA of Turin coincides with the boundaries of Turin metropolitan city. With the National Law no. 56, issued on the 3rd of April 2014, all Italian metropolitan cities had the possibilities to divide the territory on a number of "Homogeneous Zones" (HA), as optimal areas for the organization in a partnership of municipal services. These homogeneous zones respond to OECD’s definition of functional area as functional economic unit. Thus, within the LUMAT project, the FUA identified by the Italian partners (SiTI - Higher Institute on Territorial Systems for Innovation, and Città Metropolitana di Torino) is represented by the Homogeneous Zone n. 11 (HA #11) of the Metropolitan City of Turin (LUMAT project, 2016).

Within this area, 22 Municipalities accepted the LUMAT challenge and actively worked to define a shared management structure of FUA through different steps of a methodology which is conceived as a replicable model. The LUMAT partnerships worked to build this whole model which was locally adapted by the Italian partners in order to best deal with Italian policies and local needs.

The method is based on a series of workshops, training and public events, planned in order to build the capacity among people acting at the local scale. In particular, four workshops were organized for involving and training the municipalities in the following issues:

- the construction of the identity of their Functional Urban Area;
- the evaluation of FUA Ecosystem Services;
- the management of FUA land use conflicts;
- the citizens involvement.

2.1 LUMAT tools

The methodology shared among LUMAT partners also includes the use of spatial Decisions Support Tools (sDSS) as instruments for facilitating the decision-making processes in a complex environment such as the inter-municipal agglomeration. As other European partners, the Italian team agreed on analysing its pilot area through the use of the Interactive Visualisation Tool (InViTo), a web based mapping tool developed by SiTI (Pensa & Masala, 2014; Pensa et al., 2014).

InViTo is conceived as a toolbox, which provides a visual support to the analysis and communication of both georeferenced spatial and non-spatial data. It aims at facilitating the processes of policy and decision making, focusing on data sharing and information visualisation as a vehicle for the public involvement in the planning processes. Based on simplicity for a more efficient communication between the parties and a more confident tool to trust on (Portugali et al., 2012; Massoudi & Vaidya, 2018), it generates maps, where information and localisation are correlated so to provide an essential instrument for the knowledge of urban dynamics in the definition of specific policies (IBM, 2014; Ringenson, et al., 2018; Google LLC, 2018). This platform has a double function. First, it allows geo-data to be mapped and filtered in order to monitor the present land uses, pointing out critical issues or outlining opportunities. Second, it allows the production of maps which can be weighted on the basis of different parameters thus enabling the discussions among the involved stakeholders.

In this context, the Public Administrations were provided with methodologies and tools for the sharing of information both among municipalities, and between them and citizens. The representatives of municipalities were supported in the definition of a common and shared data platform in which all the official spatial data relative to the FUA boundaries were included.

Thus, a series of geo-datasets was uploaded in InViTo (<http://www.urbantoolbox.it/project/lumat-en/>): transport infrastructures, cultural heritage, environmental protected areas, flood zones, industrial zones, touristic accommodations, paths and point of interests, masterplan parcelling, anthropized areas.

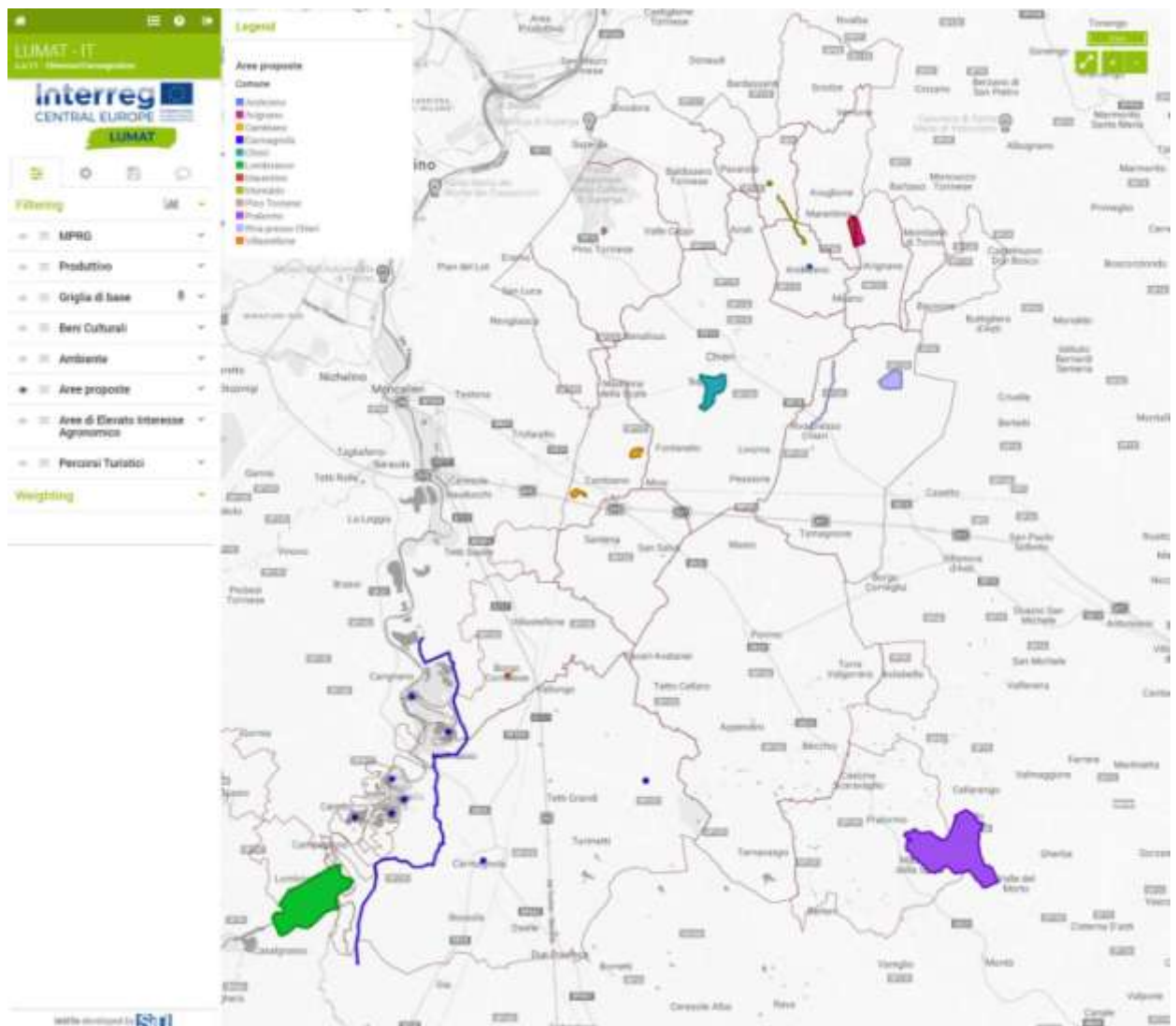


Figure 1 - Identification of areas of interests for the municipalities involved in the Italian case study of the LUMAT project.

As first step, municipalities were asked to provide data about areas of interest (AoI) within their territories (green areas, brownfields, greenfields, new projects to be defined...), with a number of information (localization, attributes, description of their particular features and elements) for better understanding their possible uses. Those areas were input in InViTo and shared among all the municipalites (Figure 1).

Once this dataset was ready, it was presented in a meeting with the involved municipalities, in which both politicians and technicians were invited to provide their opinions and feedbacks. Datasets describing the territory were showed to the audience and put in relation to each other, in order to check the reliability of included data and the possible lack of other elements. Then, some specific data were filtered in order to address the discussion towards a specific topic. In this case, the discussion focused on bikepaths and touristic points of interests such as cultural heritage elements, environmental sites such as the UNESCO protected zone included in the FUA. While projected on a wall screen, InViTo interface generated a map in real time which outlined in green the areas more suitable for touristic purposes, while in red, it highlighted all the areas with no attractiveness (Figure 2). This map brought the discussion to consider the reasons why those red areas were not attractive and which kind of interventions could have improved their appeal to not-local people. Finally, all these elements have been considered in relation to the areas of intersets previously identified by each municipality, helping public stakeholders in intuitively understand the relation of each AoI with their surrounding, giving evidence of the context in which each intervention should be located.

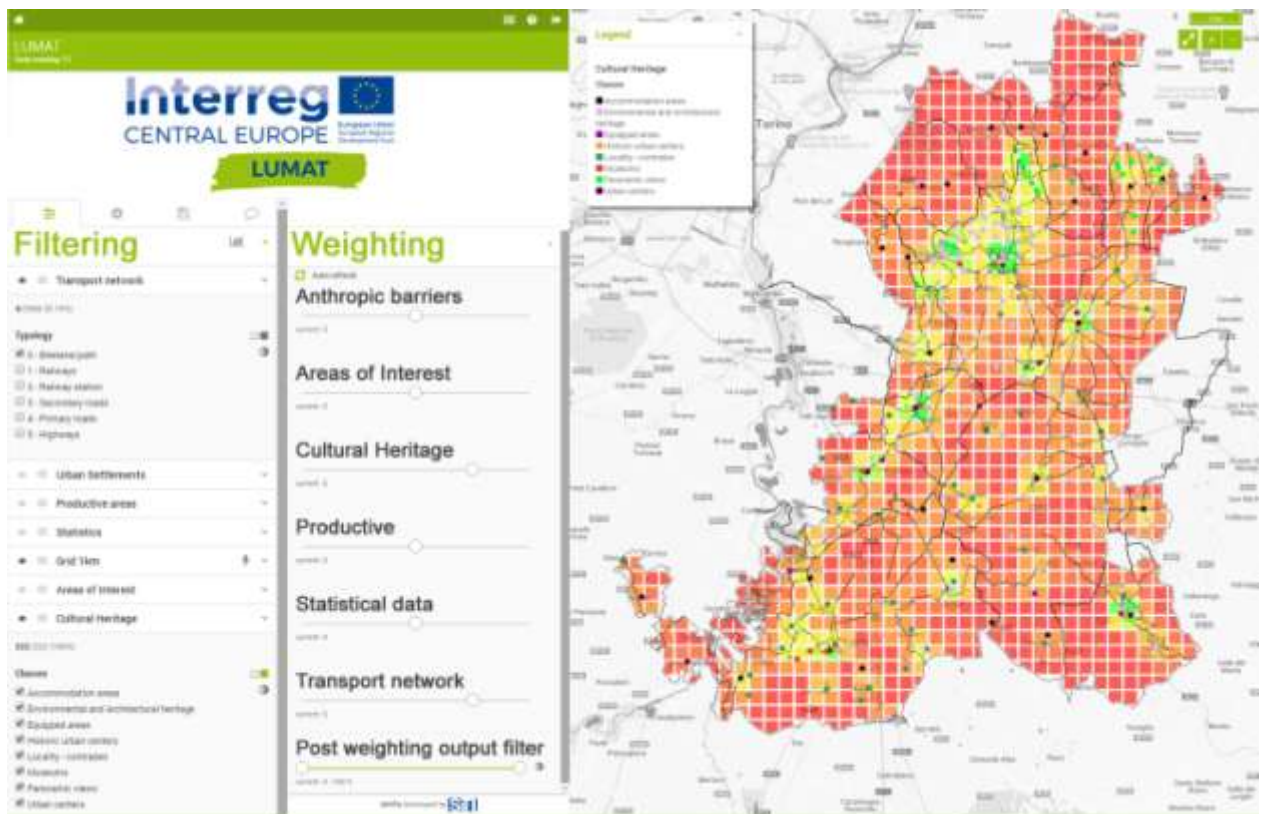


Figure 2 - Creating development scenarios through changing the indexes values.

Both politicians and technicians positively valued the tool, firstly, as a stimulator of debate and, secondly, as an important support for decision-making processes. In particular, they appreciated the possibility to visualize the entire area at once, providing a general “perception of the whole” of FUA, where municipal boundaries were out of the considerations on environmental needs and necessary solutions.

The steps defined by the Action Plan will be implemented in the next months within the pilot area located in the FUA. The pilot area was identified to test a model of integrated environmental management. Here, the development strategies will be discussed in order to highlight the main opportunities and the most urgent critical issues to be solved for the whole area. The ecosystem services will be input in InViTo and related to the infrastructural elements and territorial peculiarities in order to provide further geo-referred maps of the FUA, describing how the territory can develop urban resilience to specific interventions projects. This will provide important information to decision and policy makers before the approval of design or funding.

3. Conclusions

Since LUMAT is an ongoing project, final outputs and results still need to be completed. Nevertheless, it is already evident that LUMAT project represented an opportunity for Homogeneous Zones n.11 of the Metropolitan area of Turin. HZ#11 has been integrated in a vision where the concept of sustainability applied to an integrated land use management, provided the chance for improving the quality of an entire territorial system. The most relevant results of the projects are, on one side, the political strategy to group all the municipalities into one cohesive identity agreement, and, on the other side, the advantages demonstrated by the use of technological tools to support the decision-making with scientific analysis: this showed how highly stressed areas can find a more environmental friendly model to challenge the future. The main results from the application of the strategy at local level are the definition of a local Action Plan, that will guide future cooperation activities within the Homogeneous Zone, and the development of a pilot action that can be used as a test for future development projects to be implemented in the area.

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