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THE TIMES THEY ARE A-CHANGIN'

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Contents

EDITORIAL PREFACE: TEMA JOURNAL OF LAND USE MOBILITY AND ENVIRONMENT 2 (2019)

THE TIMES THEY ARE A-CHANGIN'

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According to the National Research Council of the United States, resilience is the capacity of defining and programming operations to resist and/or to recover, or to adapt, in the most proper way, as regards disruptive events, whether they be actual or merely possible (Gilbert et al., 2015). Particular attention is paid to horizontal and vertical technical cooperation within the different bodies of the public administration and to participatory processes which involve representatives and stakeholders of the local communities, enterprises of the profit and non-profit sectors, civil society groups and so on.

The "PEOPLES Resilience Framework" (PRF) (Renschler et al., 2010), where PEOPLES stands for "Population and demographics, Environmental/ecosystem services, Organized governmental services, Physical infrastructure, Lifestyle and community competence, Economic development, and Social-cultural capital," states that resilience of the urban contexts is characterized, in terms of resistance, adaptation and recovery, as the long-run conservation of adequate performances as regards population density and structure, environmental resources and ecosystem services, basic and intermediate services and infrastructure provided by the public administrations, social and economic sustainability, local development and progressive increase of the social and cultural capital. Under this perspective, the system of the "Baseline indicators for communities" (Cutter et al., 2014) identifies 49 performance indicators whose benchmarks are related to social structure, economic situation, conditions of the built environment (housing and infrastructure), institutional framework, human capital, and environmental and social quality of the urban contexts. Similarly, the "City resilience framework" (CRF) assesses the size of urban resilience by twelve objectives and 52 indicators, concerning the local governance framework and related leadership, the quality of urban life and of social welfare and relationships, the public services and infrastructure, and the state of health of the urban economy (Arup, 2014).

From this point of view, the resilience of urban fabrics not only is related to consistent use of technologies effective in hindering dangerous impacts on the quality of life of the communities or in catalyzing quick recovery from disruptive shocks, but also, and above all, is connected to the implementation of virtuous cooperative processes which involve public administrations and members and groups of the local societies. Resilience builds upon implementing public policies into spatial planning through the participation of stakeholders endowed with the proper expertise to improve substantially the quality and the effectiveness of decision-making processes through cooperation with public bodies who provide the communities with a sound and proactive commitment towards the common good.

A relevant aspect which characterizes resilient communities is their self-assessment expertise, whose an important paragon, in terms of capacity building is represented by the "Communities advancing resilience toolkit" (CART) (Pfefferbaum et al., 2013). The CART provides a guidelines handbook and a self-assessment toolkit addressed to local communities which can be used in several local planning fields (Gilbert et al., 2015). The "Community resilience system initiative" (CRSI) (CARRI, 2011) focuses on the same target, with the aim of improving public awareness concerning resilience-related themes, which should become public wealth of knowledge. The implementation of capacity building in terms of community self-assessment and

wealth of knowledge. The implementation of capacity building in terms of community self-assessment and public awareness not only drives the local societies towards resilience-oriented adaptation and recovery planning practices, but also towards implementing spatial planning based on visions embedded in a resilience-oriented public policy framework (Gilbert et al., 2015).

The CARRI's report (2011) is particularly rich in directions concerning good and best practices on urban resilience based on self-assessment of the local societies. The Annex 3 of the report analytically presents the outcomes of a partnership process between CARRI and the communities of three counties of the United States, namely, Charleston Tri-County Area (South Carolina), Gulf Coast of Mississippi and Memphis/Shelby County (Tennessee). Three action plans were implemented by partnerships involving the county administrations and CARRI, which focused on urban resilience, and were translated into concrete operations related to the urban contexts of the three counties. In the case of the Tri-County Area, the plan consisted of a complex and articulated set of operations aimed at improving the local transportation system, and, in particular, the road traffic, the railway organization and the commuting opportunities. The Gulf Coast County and CARRI studied and implemented a set of operations to mitigate the environmental damages generated by the Deepwater Horizon oil spill coming from the BP platform located in the Macondo Prospect, in the United States Exclusive Economic Zone of the Gulf of Mexico. The plan action of the Memphis/Shelby County focuses on a system of initiatives which implement urban economic development based on cooperation of locally-based small enterprises and family-run businesses. The planned operations entail a set of interventions concerning building urban resilience against seismic events.

The good practices based on CRF, CART and CRSI are highlighted by the scientifically and technically qualified, intersectoral approach to the implementation of urban resilience-oriented operations. Incremental, bottom-up processes of capacity building and self-assessment which involve the urban societies characterize the exportability of these methodologies to other international contexts.

The seven articles proposed in this issue of TeMA are drawn from studies presented at the INPUT aCAdemy 2019 Conference held in Cagliari on 24-26 June 2019, titled "Planning, nature and ecosystem services." The issue of urban resilience-oriented spatial analyses and planning practices was one of the themes treated and discussed throughout the Conference sessions, and a selection of these studies is presented through the articles of this issue of TeMA, which are consistent with the scientific and technical lines discussed in this editorial preface. The question of local transportation system, which is one of the main issues addressed by the action plan which implements the CRSI into the Tri-County Area, is treated by Santos and Moura and by Di Ludovico and Rizzi, who focus on the mobility system and preferences related to walkability with reference to the Belo Horizonte urban context and to the post-earthquake urban environment of the Italian City of L'Aquila. In the case of L'Aquila, the theme of walkability merges with the resilience-related question concerning recovery after a critical natural disaster. The spatial organization related to the urban functions concerning the Mustapha Pacha Hospital within the North African metropolitan context of Algiers, discussed by Ghida et al., and the assessment of the implementation of a green infrastructure in the Turkish Pendik District, described by Ustaoglu and Aydinoglu, propose planning tools and methodological approaches consistent with capacity building and public awareness processes. Ladu et al. assess the ongoing process of the implementation of a big project within an Italian medium-sized metropolitan area, the new soccer stadium of Cagliari, whereas Pilogallo et al. discuss the implementation of renewable energy plants into the spatial context of the Melfi area, located in the Southern Italian Region of Basilicata. Both studies are closely related to the theoretical and technical approach to urban resilience entailed by the action plan of the Memphis/Shelby County, quoted above. Finally, the strategy concerning the implementation of the sustainable development paradigm into the planning policies of medium-sized cities of the Italian regional context of Western Sicily, presented by Vinci and Cutaia, is in line with the PRF's statements.

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XXIV International Conference
"Living and Walking in Cities"
12-13 September 2019, Brescia (Italy)

The International Conference "LIVING AND WALKING IN CITIES" (LWC) traditionally looks at different themes concerning the quality of life in urban areas. The goal of this event is to gather researchers, road users, administrators, technicians, city representatives and experts aiming to discuss problems that affect the safety of pedestrians in the city, especially of children and persons with reduced mobility. The conference attracts practitioners and researchers who can find detailed presentations on policy issues, best practices and research findings across the broad spectrum of urban and transport planning. The conference covers international issues, national and local policies and the implementation of projects at the local level. The conference presents a great opportunity for networking and forming career-spanning professional relationships. Although sessions at the Conference can be challenging in discussing matters of policy at the highest level, they can also provide good, basic education and training opportunities. The Conference "Living and Walking in Cities" provides a forum to discuss the challenges of economic growth, social and demographic changes to become more sustainable. Planners and practitioners are being asked to improve and retrofit towns, transportation infrastructure and public spaces. They are finding solutions for resilience in the face of threats posed by climate change, energy and infrastructure security; At the same time, they need to develop hard and soft measures to improve the safety of walking and cycling which affects health and fitness. This is desirable to be done through research and studies that are innovative, interdisciplinary and cross-border.

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ECOSYSTEM SERVICES' BASED IMPACT ASSESSMENT FOR LOW CARBON TRANSITION PROCESSES

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ABSTRACT

Low carbon transition represents one of the main challenges engaging territorial governments in a multi-scale structure of planning and actions. The thematic focus on renewable energies sources (RES) development prevailed on an integrated approach to plan such relevant process in a more integrated and systemic view based on multiple territorial values estimation and the assessment of potential conflicts depending on technological and landscape impacts

RES transition implies extensive territorial transformations and, in the case of Italy, the public management spent more effort in targeting RES installation objectives more than proposing a territorial plan of suitable area where such a process might be development preserving local territorial structure and values.

This paper presents the results of an ex-post analysis carried out to assess the effects of the rapid advent of renewable energy plants in a specific territorial context: Melfi area in Basilicata (Italy). Such a context is characterized by agricultural vocation and high natural values, but also representing the settlement place of the biggest industrial automotive center in the south of Italy.

The research approach is based on ecosystem services assessment through selected INVEST tools according with the presence of relevant specific features in the investigation area: carbon stock and storage, crop production, crop pollination and habitat quality.

Results allow to quantify an extensive territorial impacts generated by photovoltaics plants and wind-farms compared with production potential. Consequently policy recommendation are proposed in order to improve the governance model for future development of the sustainable energy sector in Basilicata.

KEYWORDS:
RES; Ecosystem services; Low carbon; Energy transition

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针对低碳转型过程、基于生态系统服务的影响评估

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摘要

在各种需要地域政府开展多尺度结构规划及行动的各种主要挑战中，低碳转型是典型的一种。这一课题关注与可再生能源（RES）的开发，因此需要寻求一种综合方法，来从一个更加完整和系统性的角度、基于多种地域价值观的估量和对取决于技术和景观影响的潜在冲突的评估，进行相关过程的规划。

RES转型意味着大量的地域变化；而在意大利，公共管理方在实现RES装置目标方面投入的工作超过了为适当地区制定地域计划的努力——在这样的地区，这一过程可能是保护开发的当地地域结构和价值观。

本文介绍了旨在评估特定地域环境下迅速出现可再生能源植物的影响的事后分析的成果：意大利巴斯利卡塔大区的梅尔菲地区。该地区的特征为农业职业和较高的自然价值，其同时还是意大利南部最大的汽车工业中心所在地。

研究的方法是基于通过选定的投资工具进行的生态系统服务评估，根据调查地区有关具体特征——碳储量、作物生产、作物授粉和栖息地质量等的情况确定。

研究结果可以将光伏发电厂和风力农场产生的广泛地域影响对比生产潜力，并进行量化比较。并据此提出了政策方面的建议，以期改善巴斯利卡塔将来在可持续能源领域谋求发展所采用的治理模式。

关键词:
可再生能源RES; 生态系统服务; 低碳能源; 能源转型

1 INTRODUCTION

The hoped-for energy transition to renewable sources of supply has had a major boost in recent years. Incentive policies and simplified authorization have led to the widespread presence of RES plants that in some contexts have radically changed the landscape. It is the task of urban and territorial planning to define a methodological framework and significant criteria for assessing the sustainability of these measures for the transformation of the territory.

1.1 ECOSYSTEM BASED PRO-VOCATION

The 2005 Millennium Ecosystem Assessment (MA) could be considered one of the main efforts to promote worldwide effective environmental assessment approaches, sponsored by the United Nations. The most provoking contribution promoted by MA is based on the concept that the ecosystem values in decision-making should be grounded on the idea of services provided to humans. This requires new interpretative parameters and computational tools in order to produce the required additional knowledge to reinforce the rational 'decision makers' in making 'better' decisions and policy choices (Owens, 2005; Sanderson et al., 2002).
Compared to that, "sustainability" has become a main policy concern both domestically and internationally, with increasing prominent place in decision-making processes concerning environmental issues (Bulkeley & Jordan, 2012). However, such a rising awareness in political debate produced strong thematic commitments: i.e. RES transition as a way to reduce CO_2 emissions. We are in the case of a conflict between human activities and the environment (fossil energy production, mainly) had been addressed through a generalized technological settlement of new systems which strongly reduced impacts of energy production in terms of CO_2 emissions, but generates other externalities affecting territorial values and landscape identities in a context of de-regulation in urban and regional planning.
Ecosystem services allowed to oppose a quantitative assessment of eco-systemic values in the procedure of environmental impacts assessment for RES plants settlement process. It becomes a tool for decision makers to govern more effectively territorial transformation even urban plans are not suitable to face the issue of RES installation according with the current normative system.
In order to demonstrate such conflictual situation we refer to a specific case study area: Melfi municipality in Basilicata (Italy). We consider the achieved results as a contribution in developing understanding of ecological knowledge use in policy driven processes that are more sensitive to the issues of power and control (Cowell & Mick, 2014; McKenzie et al., 2014; Scorza, Pilogallo & Las Casas, 2018), the ambition is to provoke strong advances in territorial governance by the mean of the new paradigm of ecosystem services based planning.

2 CASE STUDY AREA DESCRIPTION

The research has been structured on the municipal scale. In facts the study area includes the territory under the administrative jurisdiction of Melfi municipality. Melfi is located in the Basilicata region in southern of Italy (Fig. 1). Melfi is the third largest municipality in the region for resident population and territorial extension. The territory is characterized by the presence of San Nicola industrial area. An extended industrial area where most important plant for car production in the South of Italy where established by Fiat Chrysler Automobiles group (FCA). On the natural and landscape point of view the study area presents a strong agricultural vocation with relevant sites characterized by considerable naturalistic and environmental features. The area is significant because it has a peculiar land uses structure and, since 2010, it has been affected by numerous installations of RES plants. In 2018, in the study area, we mapped 66 installations of large wind farms (power of each wind tower greater than or equal to 1 MW) and 113 concerning small wind farms (power less than 1 MW). The estimation of total installed wind-power production capacity is around 219 MW. Moreover, for the photovoltaic sector there are 7 photovoltaic fields for a total occupied area of about 140.000 square metres.

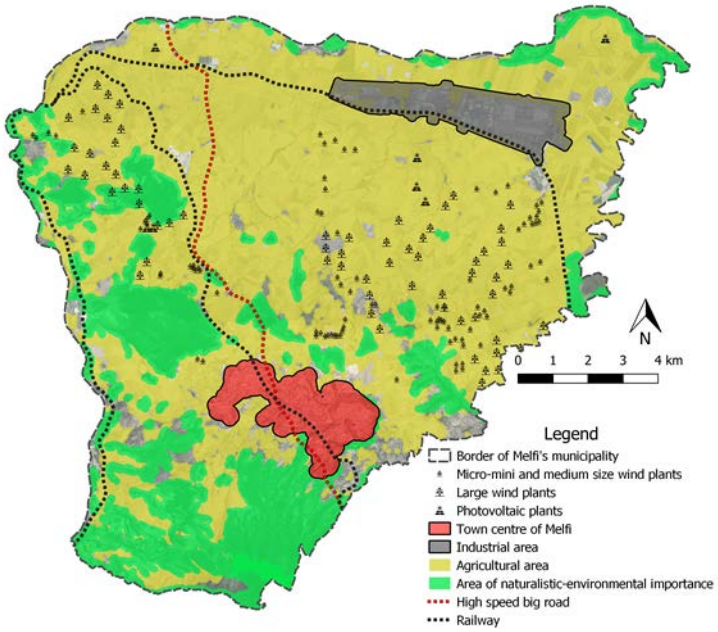


Fig. 1 Geographical overview of the study area, major land use classes, wind-power plants and main mobility infrastructures

3 METHODOLOGY AND RESULTS

This research aims to describe the impacts of a widespread growth in the renewable energy production plants in terms of loss of ecosystem services. For this purpose, considering the specific territorial features synthetically described in the previous paragraph, the analytical process had been based on four ecosystem services: Carbon Storage and Sequestration, Crop pollination, Crop production and Habitat Quality.

The analytical models used are included in the InVEST (Integrated Valuation of Ecosystem service and tradeoffs) suite (Nelson et al., 2018); territorial analyses were then produced in order to obtain a representation of the spatial distribution of the thematic and cumulative impacts depending on RES installation with consequences on the territorial capacity to provide ES.

3.1 CARBON STORAGE AND SEQUESTRATION

The assessment of the carbon stored within the study area was carried out using the tool "Carbon Storage and Sequestration" which returns a raster map which, pixel by pixel, is associated with the value of carbon stored in Mg/ha.

Input data are land use/land cover (LULC) map and a corresponding table with the four values of carbon pools. The resulting raster maintains the same resolution as the input cover map. The pixel size is 5x5 m and this allows a higher spatial accuracy including also the contribution in terms of carbon stored by urban green areas. The Tab. 1 shows the values used for each LULC class. The carbon pools estimation includes values provided by INFC (Gasparini & Tabacchi, 2011) for wooded classes plus IPCC (international panel of Climate Change) (IPCC, 2006) for the remaining ones.

The working hypothesis is to assimilate the areas affected by RES plants to the urban environment or, more generally, to a process of "land take" that cancels the contribution of these surfaces in terms of ecosystem services.

LUCODE	DESCRIPTION	C_ABOVE	C_BELOW	C_SOIL	C_DEAD
11	Residential buildings in compact urban centres	0.00	0.00	0.00	0.00
12	Residential buildings in dispersed urban centres	0.00	0.00	0.00	0.00
13	Buildings for industrial and commercial use	0.00	0.00	0.00	0.00
2	Road network (roads and railways)	0.00	0.00	0.00	0.00
3	Quarries and landfills	0.00	0.00	0.00	0.00
4	Gardens and urban greenery	15.00	0.00	0.00	0.00
511	Orchards	63.00	7.85	1.00	0.00
512	Vegetable gardens	0.00	4.7	62.57	0.00
513	Arable land	0.00	4.7	62.57	0.00
514	Olive groves	63.00	7.85	1.00	0.00
515	Vineyards	63.00	7.85	1.00	0.00
53	Fallow pasture	0.00	4.7	64.50	0.00
54	Woods	160.00	58.00	64.50	20.50
541	Coniferous woods	160.00	52.00	64.50	20.50
542	Broadleaf woods	160.00	59.80	64.50	20.50
62	Watercourses	0.00	0.00	0.00	0.00
7	RES plants: wind farms and photovoltaic fields	0.00	0.00	0.00	0.00

Tab. 1 Summary table of carbon pools values used for the study area

3.2 CROP PRODUCTION

The "Crop production - percentile" was developed to carry out trade-off analyses where the transformation hypotheses concern changes in land use in favor of or starting from agriculture.
On the basis of a global scale climate model, it is possible to make productivity estimates of 175 kinds of crops. Data used by the model comes from the FAO database supplemented by national and regional datasets.
In order to assess tradeoffs between an increase in agricultural profitability and expected loss of ecosystem services, calculations make it possible to predict and to estimate the productivity of an area in relation to certain types of crops and their relative economic benefits, while neglecting the impact of different management practices.
An alternative field of application is that of the present work, which has instead aimed to estimate the effect of policies and phenomena of territorial transformation on agricultural productivity in the area under consideration. The result is a spatial distribution of the yield expressed in tons per pixel.
Required input data consists of a land use map and a corresponding table of crops. A further table is required containing the values in kg/ha of the nitrogen, phosphorus and potassium compounds on average used throughout the study area. For the purposes of this work, values indicated in the Integrated Production specifications of the Basilicata Region for wheat and vineyards have been adopted.

CROP NAME	NITROGEN RATE	PHOSPHORUS RATE	POTASSIUM RATE
Grape	80.0	100.0	125.0
Wheat	110.0	35.0	30.0

Tab. 2 Summary table of fertilizers compounds values used for the study area

The territory of Melfi is in fact one of the areas of cultivation included in the DOCG regulations of the *Aglianico del Vulture Superiore*. Wheat, on the other hand, has been selected as an example of the numerous and extensive non-irrigated arable crops present.

As far as non-irrigated arable crops are concerned, they cover about 20,174 hectares, with a much more advantageous distribution compared to the vineyards. Not having detailed information regarding type of crops actually present, analyses were carried out considering all the arable crops cultivated with wheat.

3.3 CROP POLLINATION

Among regulation ES, the aptitude of study area to host pollinating species was investigated by using "Crop pollination" tool of INVEST that allows to map cell by cell potential presence based on a model that evaluates appropriate environmental conditions in terms of presence of suitable places for nesting and food availability. The necessary data consist in: LULC map; a table reporting indicators of suitability for nesting and/or for hosting floristic species that serve as food sources for pollinators for each LUcode; a table summarizing main characteristics of each pollinator species (maximum range, seasonality, food preferences).
Elaboration results consist in two kind of maps for each pollinator species and for each season of the year. The first kind represents an index of "pollinator supply" that expresses a measure of the availability of pollinator species considering both the accessibility to food resources and the usability of sites suitable for nesting. The second one is a "pollinator abundance" map, that is the potential presence of pollinators per pixel.
In other words, while the first map represents sites where pollinators originate, the second type of map gives indications on the places where pollinators carry out their activity by considering jointly both the available food resources that attract pollinators in individual cells, and the availability of insects that have access to the same cells.
The INVEST model was applied by considering a generic pollinator and assigning the maximum values for the availability of suitable nesting sites and food resources to wooded areas and uncultivated pastures. Intermediate values were considered for the classes of land use reserved for agricultural use, favoring the role of orchards, olive groves and vegetable gardens over that of non-irrigated arable land and considering minimum values but not zero along the riparian strips and within urban gardens and green areas. The reference year against which the changes have been evaluated is 2010, when no RES plant is recorded.

3.4 HABITAT QUALITY

The ecosystem service related to habitat quality is considered as an index of overall biodiversity, and falls within the category of supporting services. It has been estimated using the "Habitat Quality" tool of INVEST. This tool returns two raster maps of the territory under examination, one relating to the quality of the habitats and another, complementary to it, relating to the degradation of the habitats. These maps are created by combining and crossing information from Land Use/Land Cover (LULC) and threats to biodiversity. Therefore, the tool allows to model geographically the variations of the quality of the habitats and to evaluate, the positive and negative interactions between the natural environment and the anthropic activities or on the practices of use of the land.
It estimates the effect of each threat considered on the habitats analyzed, also considering the indirect effects induced by a considered combination of all the threats. Threats are to be considered as explicit spatial variables that could cause the local extinction of one or more animal or plant species. To better explain the spatial variability of the effects induced by the threats, the distance between the habitats and the source of degradation is considered. Finally, the model assesses the sensitivity of each land cover class considered as habitat to each individual threat, with a different weight.
The input data required by the tool are: (1) LULC Map; (2) Threat table: containing all the threats that the model must take into account with their weight (between 0 and 1) and impact in space (in km); (3) Threat maps: binary type 0-1 raster maps where the value 1 indicates the presence of the threat and the value 0 indicates absence; (4) Sensitivity matrix: containing for each LULC class a number between 0 and 1

representing the suitability of that land use to be a habitat and the sensitivity of each habitat to each threat considered.

The elaboration (on a rater with a resolution of 5x5 meters) was carried out for three time intervals: 2010-2014; 2015-2017; 2017-2018. Those intervals are consistent with data availability on RES plant distribution. Moreover we included as as additional land use class the one concerning the areas occupied by RES plants. The categories set out in Tab. 3 have been taken as the source of the threat on the basis of comparisons between different attributes in a variety of scientific articles (Chu et al., 2018; Sharma et al., 2018; Salata, Ronchi & Arcidiacono, 2017).

LUCODE	DESCRIPTION OF THREAT	THREAT	MAX DISTANCE [KM]	WEIGHT [0-1]
From 511 to 515	Agricolture	AGRI	0.3	0.4
11-12	Residential buildings in compact urban centers and scattered urban centers	BUILD	1	0.85
13	Buildings for industrial and commercial use	IND	1.5	1
3	Caves and dumps	CADI	1.5	0.65
7	Wind and photovoltaic systems	RES	1.5	1
2	Main high-speed link roads and railways	BROAD	2	1
2	Local roads	SROAD	0.4	0.3

Tab. 3 Table of threats acting on the territory with their weights and distances of impact. Each threat represents a single class of land use (lucode) or an aggregation of several classes

For the sensitivity matrix (Tab. 4), maximum habitat values were assigned to the land use classes for forests and watercourses, and zero values were assigned to the anthropic land use classes for buildings and RES installations. For each LULC, a score of 0 to 1 was assigned corresponding to the sensitivity of that habitat to the relevant threat (Polasky et al., 2011; Sallustio et al., 2017; Terrado et al., 2016).

LUCODE	HABITAT TYPE	HABITAT SUITABILITY [0-1]	AGRI	BUILD	IND	CADI	RES	BROAD	SROAD
11; 12; 13; 2; 3; 4.	Anthropized urban area	0	0	0	0	0	0	0	0
4	Gardens and urban green areas	0.3	0.3	0.4	0.4	0.1	0.3	0.3	0.5
511	Orchards	0.5	0	0.3	0.5	0.2	0.5	0.4	0.5
512	Gardens	0.5	0	0.3	0.5	0.2	0.5	0.4	0.5
513	Arable land	0.4	0	0.5	0.6	0.2	0.8	0.4	0.5
514	Olive groves	0.5	0	0.3	0.5	0.2	0.5	0.4	0.5
515	Vineyards	0.5	0	0.3	0.5	0.2	0.5	0.4	0.5
53	Pasture or uncultivated areas	0.6	0.4	0.7	0.6	0.3	0.9	0.6	0.4
54	Mixed forests	1	0.8	0.8	0.7	0.5	0.5	0.7	0.5
541	Conifer woods	1	0.8	0.8	0.7	0.5	0.5	0.7	0.5
542	Broadleaf forests	1	0.8	0.8	0.7	0.5	0.5	0.7	0.5
62	Watercourses	1	0.5	0.4	0.8	0	0.3	0.8	0.4
7	Renewable energy production plants: Wind and Photovoltaic	0	0	0	0	0	0	0	0

Tab. 4 Sensitivity matrix where the habitat grade [0-1] is reported for each land use class (or group of classes) and the sensitivity of each habitat to the individual threat [0-1]

3.5 RESULTS

The Carbon Stock assessment allowed us to estimate in 2013 a total amount of 10,3 kTons in the study area. This value, considering only the transformations induced by RES energy production plants, undergoes a decrease of 0.31% corresponding to about 32 tons of carbon previously stored.

The agricultural productivity - Crop Production - was analyzed considering high value-added crops (viticulture) and cereal production. The RES plants almost exclusively concerned cereal production areas. Results show the presence of three climate zones within the study area, which involve the division into three classes of productivity. Regarding vineyards, values range into following three classes: low (up to 37.2 q/ha), medium (from 37.2 to 68.4 q/ha), high (greater than 68.4 q/ha).

Cereal production had been more affected by RES plants development: as can be seen from the Fig. 2, the area of greatest concentration of RES plants overlaps "Non-irrigated crops".

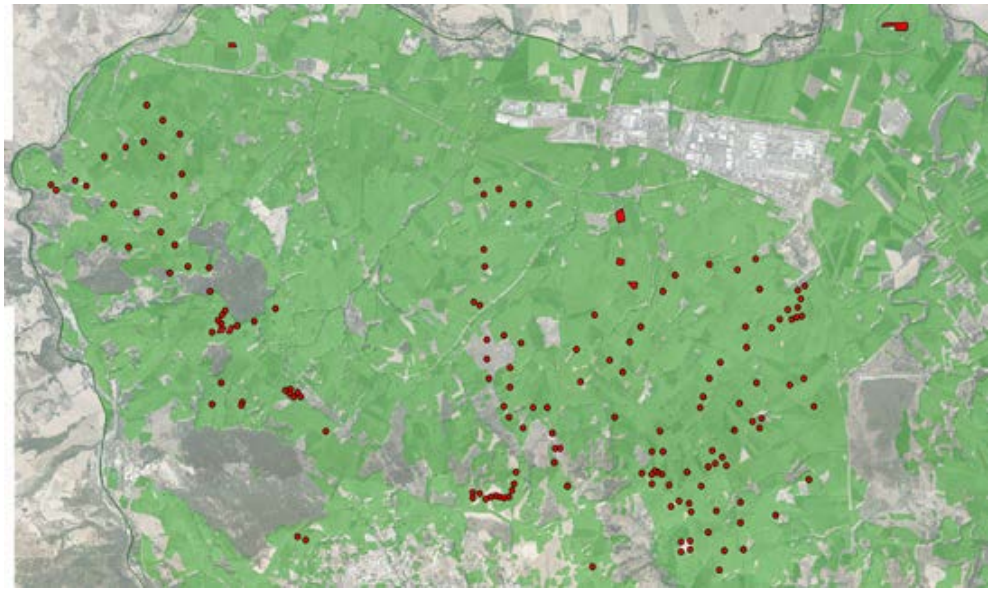


Fig. 2 Location of RES systems located in non-irrigated arable areas (in green)

Results as regards the ability to provide adequate habitats for pollinating species highlights the crucial role of wooded areas (dark red in Fig. 3) but also the variability that characterizes non-irrigated arable land on the basis of distance from urban areas.

This is particularly evident in the area immediately south of the industrial area where, although the dominant land use class is "non-irrigated arable land", the index decreases as urbanized areas come closer.

In order to evaluate the alterations INVEST has been run considering for every temporal step, plants to be added to the pre-existing ones. The following image is intended to represent precisely the loss with respect to 2010 of the index recorded by the model at the end of 2018. By overlapping RES plants to 2018, it can be seen that the ecosystem service in question is strongly affected by the density of the installations.

Concerning Habitat Quality the results were grouped into 4 macro-classes: "no-habitat", "low quality/degradation", "medium quality/degradation" and "high quality/degradation". On the habitats quality, in the time phases analysed, the percentages of land classified as "no-habitat" and "low quality" increased by 0.46% to the detriment of those classified as "medium quality", which on the contrary decreased by 0.45%.

For habitat degradation (Fig 5), in the time phases analysed, the area classified as "low degradation" decreases considerably, by 18%. In addition, the areas classified as "medium degradation" and "high degradation" together increase by about 18%.

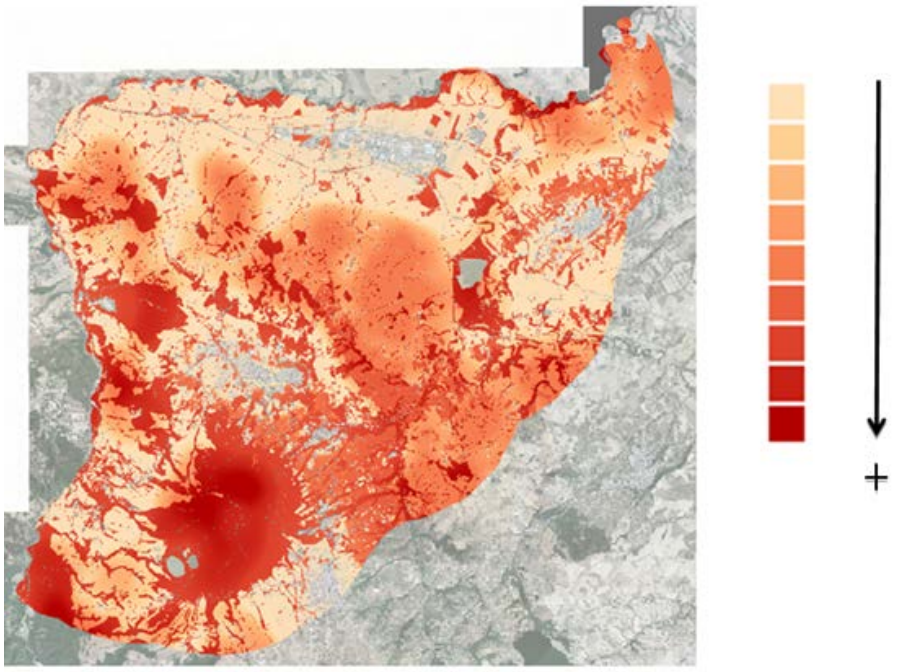


Fig. 3 Pollination supply index map for the year 2010

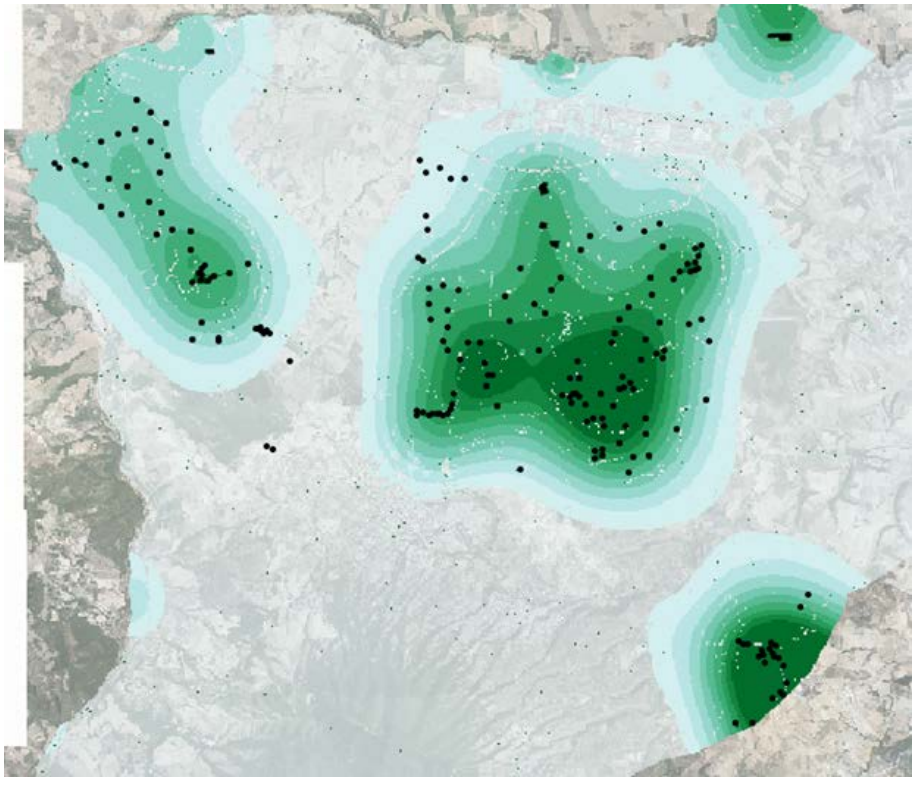
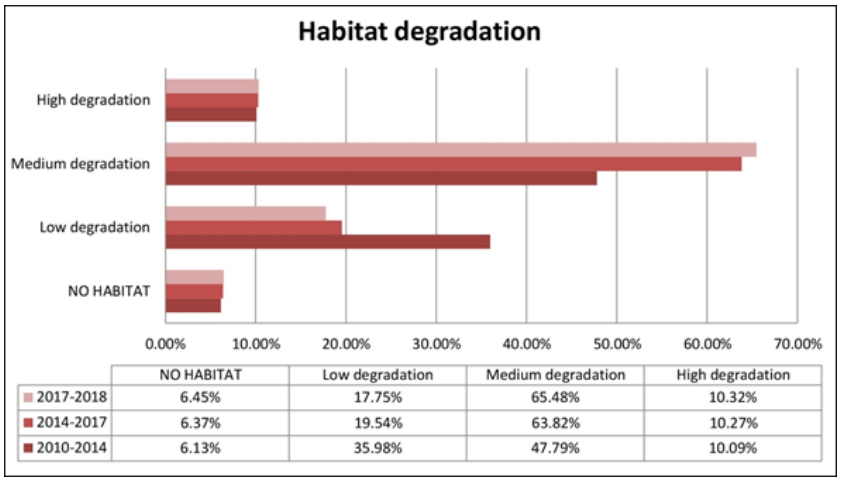


Fig. 4 Overlay between RES implants in 2018 and the evolution of the "Pollination abundance" index between 2010 and 2018

In order to provide a comprehensive estimation of the impacts produced by RES installations ore 2010 - 2018 time frame a synthetic map (Fig. 6) was delivered combining the results discussed before in a linear combination model. Such map represent the general loss of ecosystem services. Lighter colors correspond to less loss and vice versa. As it is possible to see, there are two areas that have been most altered: the first located north-west of the town, the second between the town and San Nicola industrial area.



	NO HABITAT	Low degradation	Medium degradation	High degradation
2017-2018	6.45%	17.75%	65.48%	10.32%
2014-2017	6.37%	19.54%	63.82%	10.27%
2010-2014	6.13%	35.98%	47.79%	10.09%

Fig 5 Graph of habitat degradation representing on the abscissas axis the amount of surface in percentage and on the ordinates axis the level of habitat degradation identified. The table under shows the percentage value for each time interval analysed

The first one is characterized by a low heterogeneity of the existing plants. In fact, there are mainly wind turbines with a generating power greater than 1 MW with two photovoltaic fields. The opposite situation is found in the second area in which there are wind and photovoltaic systems heterogeneous for power capacity, height of the tower and rotor diameter.

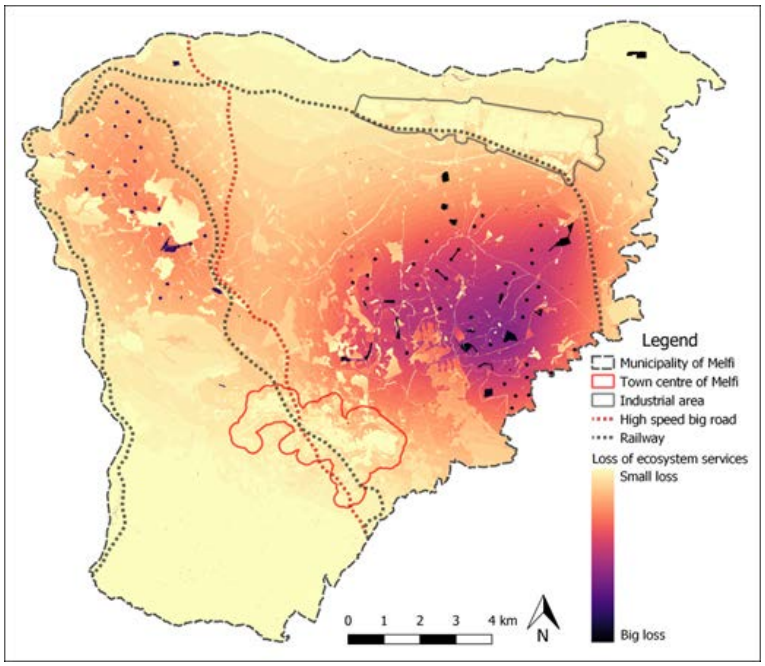


Fig. 6 Map representing the general loss of ecosystem services in the study area between extreme time intervals (2010-2018)

Such elaboration allowed to understand how the greatest cumulative impacts depends on the distribution of plants in those territories with higher density of wind-towers and photovoltaic plans. It is remarkable how the environmental assessment of a RES plants has to consider existing baseline and cumulative effects for the estimation of impacts scenario.

4 CONCLUSIONS

The aim of this work is the application of a method to evaluate territorial transformations induced by the installation of renewable energy production plants through the approach of ecosystem services (Scorza et al., 2019). The ecosystem services analyzed are those that best describe the identity characteristics of Melfi

territory, capturing the aspects of natural and environmental value and the strong agricultural vocation that is characterized both by the large extension of cereal areas and for some valuable products such as vineyards of Aglianico. A cumulative effects comes out as a comprehensive assessment of the sectoral estimation as a form of territorial sustainability performance assessment (Dvarioniene et al., 2017). Such results has to be improved in terms of more detailed estimation of the parameters selected as INPUT in INVEST models and, mainly, in the estimation of effects combination calibrated on specific on-field evidences.

However it is possible to affirm how the current procedure of environmental impact assessment for big RES plants (ore that 1 MW power capacity) is un-effective in considering the cumulative effects of the new plants in the comprehensive settlement scenario. Furthermore the small plants are authorized even without such environmental assessment procedure and their effects may be even more disruptive and uncontrollable.

It is necessary to start a process of territorial transformation monitoring (i.e. starting from effective procedures of land take and urban sprawl detection) (Saganeiti et al., 2018) to support the elaboration of sustainable energy policy at regional and municipal level based on an integrated assessment of territorial values with the global issue of reducing CO_2 emission. The ESs combined with remote sensing and advanced spatial analysis techniques could balance conflicting objective of sustainability: low-carbon energy transition, preservation of natural resources, reinforcing agriculture and food production.

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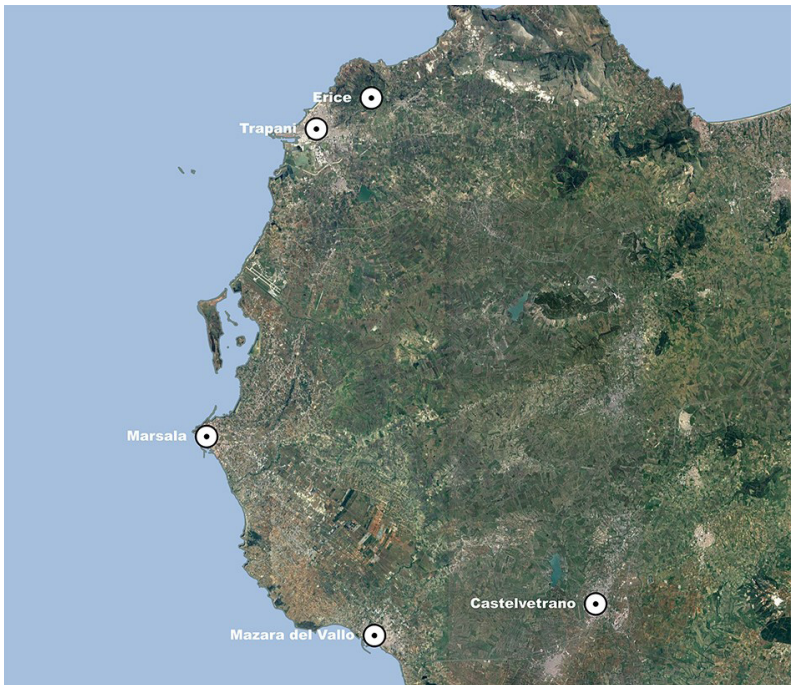

IMPLEMENTING THE ENVIRONMENTAL DIMENSION OF THE EU'S URBAN AGENDA 2014-2020

THE STRATEGY FOR SUSTAINABLE DEVELOPMENT IN THE MEDIUM-SIZED CITIES OF WESTERN SICILY

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ABSTRACT

This work illustrates the planning experience carried out by five municipalities of Western Sicily (Italy) in the the framework of the EU's urban agenda 2014-2020. The planning process has led to the definition of a Strategy for Sustainable Urban Development (SSUD), whose general objectives are strengthening territorial cohesion and to increase accessibility to the local resources. The SSUD action plan, being funded with around 70 millions euro, gives specific importance to sustainable mobility as a mean through which such objectives can be better achieved and reciprocally integrated.

After a brief description of the territory targeted by the SSUD (section 1), the paper focuses on the greenway concept within the broader debate on sustainable mobility. In section 3, a series of evidences are provided to identify the demand and potential for the development of sustainable mobility infrastructures in the five cities. In the fourth section, after describing the expceted results of the action plan in the field of sustainable transport, it is suggested why in this area a greenway is the better solution to increase accessibility to a broad range of natural resources and functions (natural sites, landscapes, cultural heritage, urban functions).

KEYWORDS:
EU's Urban Agenda; Sustainable Mobility; Greenways

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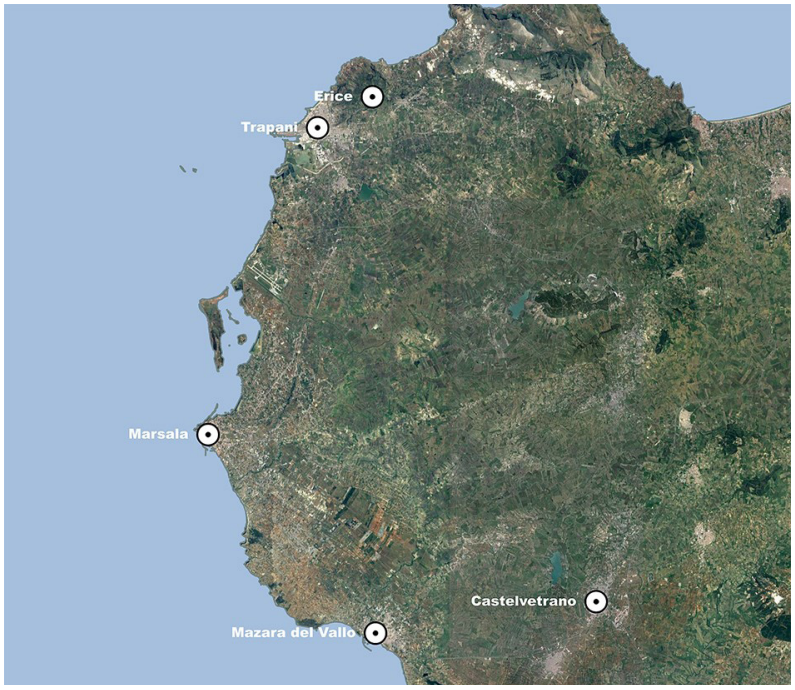

欧盟2014-2020年城市议程环境内容的实施 西西里岛西部中型城市的可持续发展战略

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摘要

本研究介绍了西西里岛（意大利）西部地区的五个自治市在欧盟2014-2020年城市议程的框架下进行规划的经验。作为该规划过程的成果，定义了一项可持续城市发展战略（SSUD），其总体目标是加强地域的凝聚力，以及提升当地资源的使用无障碍程度。该SSUD行动计划的经费投入为约7000万欧元，体现了可持续出行作为有助于更好地实现上述目标并使它们相互集成的一种手段的特殊重要性。
在简短描述SSUD针对的地域目标（第1章）后，文章通过对可持续出行的广泛讨论，着重介绍了绿色通道概念。第3章提供了一系列论据，确定了这五个城市在可持续出行基础设施开发方面的需求和潜力。第4章先是描述了在可持续交通领域行动计划的预期结果，然后又讨论了为什么对于这些具体的地域而言，绿色通道是提高大范围的资源和功能（自然遗址、景观、文化遗产，城市功能等）的使用无障碍程度的最佳解决方案。

关键词:
欧盟城市议程；可持续出行，绿色通道

1 INTRODUCTION

The territory of Italy presents a clear polycentric structure and medium-sized cities are spread across the whole country (Bonavero et al., 1999). The reason for this type of spatial organisation lies in the country's long history but also, as in other European contexts, in the capacity of medium-sized cities to offer a range of accessible services, environmental qualities and other amenities that often make these places more attractive to citizens respect to the largest urban agglomerations (ESPON, 2014; Hristova et al., 2015; Servillo et al., 2017). In this context, Sicily is one of the Italian regions with a more polycentric territorial organisation: this is witnessed, on the one side, by the number of medium-sized cities spread across the regional territory (30 towns with a population between 30,000 and 100,000 inhabitants); on the other, for the role that urban proximity plays in creating functional synergies in certain part of the region. This is particularly the case of Western Sicily, where in a range of 90 kilometres of coastline there are five medium-sized cities (Trapani, Erice, Marsala, Mazara del Vallo, Castelvetrano), home of around 250,000 inhabitants, which share relevant resources for sustainable development: infrastructures, such as an international airport, commercial ports and marinas; natural sites of community importance and distinctive landscapes; cultural amenities of international relevance (i.e. Erice old town, Selinunte archaeological site).

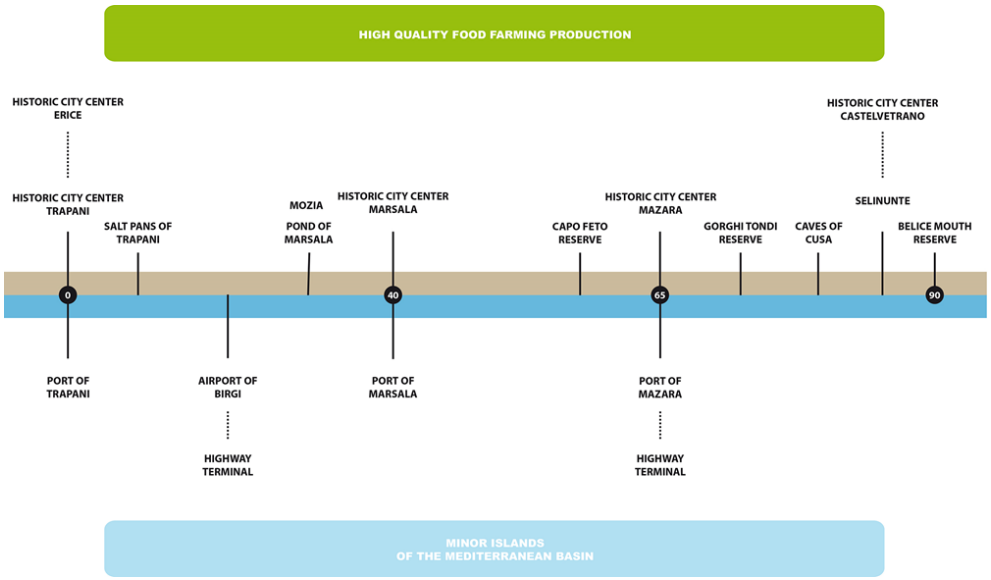

Fig. 1 The distribution of urban and environmental resources along the coastline of western Sicily (Source: authors)

In the framework of the 2014-2020 EU's programming cycle, in 2016 the above mentioned five municipalities started a cooperation process to carry on a joint Strategy for Sustainable Urban Development (SSUD), responding to the following overall objectives: (a) promoting territorial cohesion and increased functional synergies among the cities; (b) to increase accessibility to the urban and environmental resources; (c) improving the availability and efficiency of local services, particularly in the fields of sustainable mobility and social inclusion. The strategy, being funded with around 70 million euro from the European Regional Development Fund (ERDF), will be implemented through an action plan with a specific focus on the urban waterfronts, places still characterised by unsolved environmental problems, but where the three above mentioned objectives can be achieved with a larger impact in terms of sustainability, urban regeneration and local development. This paper aims to explain the methodology followed to quantify the SSUD targets in the field of sustainable mobility and to identify a greenway as an instrument to combine environmental and local development goals within the urban areas.

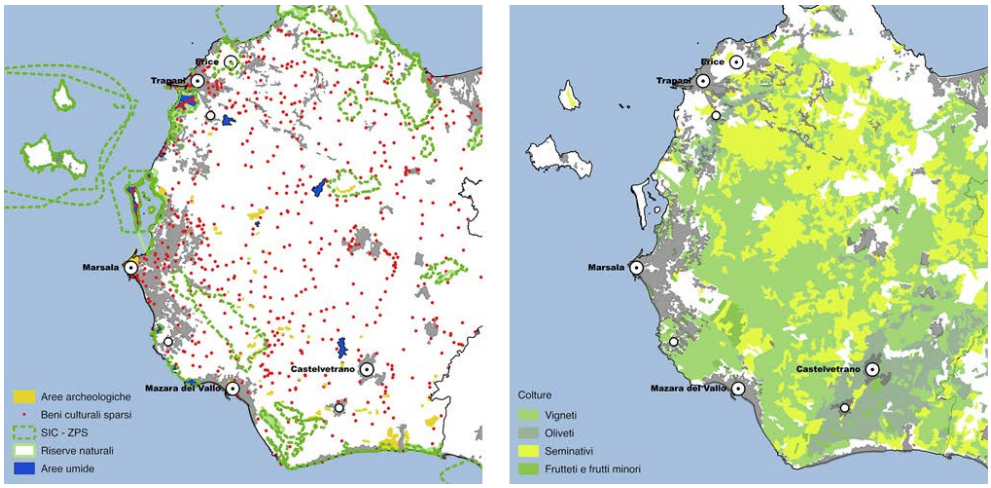

Fig. 2 Natural resources, cultural heritage (left) and farming land coverage (right) (Source: authors)

2 CONCEPTUAL FRAMEWORK

Over the last two decades, the sustainable mobility paradigm have dominated the planning debate, to the point that cities all over the world are committed to promote environment-friendly transport policies (Banister, 2008; Grieco & Hurry, 2012). Changes in the social behaviours, also, implicate the emergence of new ways people relate with the places and environment, with the consequence of creating a demand for new types of infrastructures and new challenges to urban planning and design (Bertolini, 2017; Hickman et al., 2013). These new demands for sustainable mobility can be addressed in an holistic way by reconceptualizing the concept of "green infrastructures". With ancient roots and analogies with the concepts of "parkway" and "green belt" in the landscape ecology literature (Fabos, 1995), green infrastructures can be interpreted as a set of interconnected natural spaces that, while preserving the values and functions of a natural ecosystem, provides also wider benefits to human population (Benedict & McMahon, 2006). Such renewed scenario requires a completely different approach to planning and design of mobility networks. Particularly, transport networks have to be conceived through multifunctional criteria, going beyond the administrative barriers and by reconsidering the landscapes and natural areas as sources for the provision of ecosystem services (Lovell & Taylor, 2013). From this conceptual perspective, slow-mobility infrastructures can be easily accommodated within the existing natural networks, achieving both the objectives of ensuring better accessibility to places and contributing to regenerate the environment (Steiner, 2010). Within the urban areas, greenways (that are part of the green infrastructure concept) can contribute to achieve a wide range of sustainable development goals, as for instance: (a) providing alternative transportation opportunities, reducing congestion and pollution; (b) mitigating the conflicts bewteen built and natural environments, enabling people to enter in contact with nature (Gill et al., 2007; Gobster, 1995); (c) increasing social interactions in the opena spaces (Kazmierczak & James, 2007; Shafer et al., 2000). Furthermore, greenways are recognised as an instrument to increase the resilience of urban environments, contributing to face issues such as storm-water management, seasonal flooding, and the 'heat island' effects (Chon & Shafer, 2009). Cycle pathways play a crucial role in the implementation of the greenway concept within urban areas, given their compatibility with the environment and the response they can give to the growing demand for safe and sustainable means of transport within the cities. It has been demonstrated (Hankey et al., 2012) that in urban areas bicycle traffic can be considerably increased by the presence of well designed bicycle facilities (+37%) and even more from the presence of off-street bicycle facilities (+32%). Consequently, the provision of integrated networks of walking and cycling pathways can provide a great impact on the overall urban mobility and on the home-work trips particularly (Buehler & Pucher, 2012). Moreover, there are evidence that a rise in the bike/pedestrian movements can be frequently associated to an increase in the use of public transport, especially where the "grey" infrastructures

are effectively interconnected with the "green" ones (Forman et al., 2003). Ensuring the creation of green infrastructures within urban areas, however, can be pursued only through a long-term sustainable development strategy, being implememted through integrated action plans able to affect different domains and policy-sectors (Ahern, 1995; Socco et al., 2007). It is with this conceptual framework on the background that the greenwway concept has been embedded within the Strategy for Sustainable Urban Development of Western Sicily. Bike pathways, particularly, have been identified as an instrument to combine a wide range of local development objectives, including urban regeneration in the coastal neighborhoods, a reduction of motorised trips by residents and a better access to the tourist destinations.

3 SETTING THE DEMAND FOR SUSTAINABLE MOBILITY

The mobility component of the SSUD have been supported by an exploratory study of the mobility flows within and among urban areas of Western Sicily. By applying a consolidated methodology, the analysis has taken into account the following variables: (a) the amount of movement between each urban area, (b) for which purposes these movements are generated, and (c) the related "modal split". By taking into account the least available data (ISTAT, 2011), we made an Origin-Destination Matrix (OD) for a sample of daily 'home-work' and 'home-study' trips within the five municipalities under consideration. As it is well known in the literature (Cascetta et al., 1993; Lo et al., 1996; Bierlaire, 2002; Wong et al., 2010), this approach uses procedures for processing categorical data, showing the frequency with which the subjects of a given class of origin are present in a given class of destination. In the case under analysis, the cross-section is constituted by 94,975 individuals, which generate 41,908 movements for study reasons and 53,066 for work reasons. Regarding the inter-municipality trips, the main flows are concentrated from Erice to Trapani and vice versa, two towns that are strictly interconnected from a spatial and functional points of view. Being the seat of the province, the city of Trapani is the largest pole of attraction also for the other municipalities, while Marsala ranks as the first urban area in terms of internal movements (Tab.1).

DESTINATION/ ORIGIN	Erice	Trapani	Marsala	Mazara del Vallo	Castelvetrano	Total
Erice	5,633	5,162	123	12	14	10,946
Trapani	2,935	22,876	339	55	27	26,234
Marsala	99	1,067	26,503	484	107	28,263
Mazara del Vallo	5	310	413	16,524	660	17,914
Castelvetrano	5	237	83	237	11,053	11,616
Total	8,679	29,654	27,462	17,315	11,863	94,975

Tab. 1 Origin-destination matrix of systematic movements in the SSUD area (Source: ISTAT, 2011)

	INCOMING FOR STUDY (2011)	INCOMING FOR WORK (2011)	INCOMING FOR TOURISM (2015)
Erice	461,074	742,388	84,526
Trapani	996,811	2.295,652	208,294
Marsala	186,541	515,174	170,301
Mazara del Vallo	80,654	351,634	65,077
Castelvetrano	245,182	295,085	353,662
Total	1,970,262	4,199,933	881,860

Tab. 2 Incoming flows for movement reasons (Source: ISTAT, 2011)

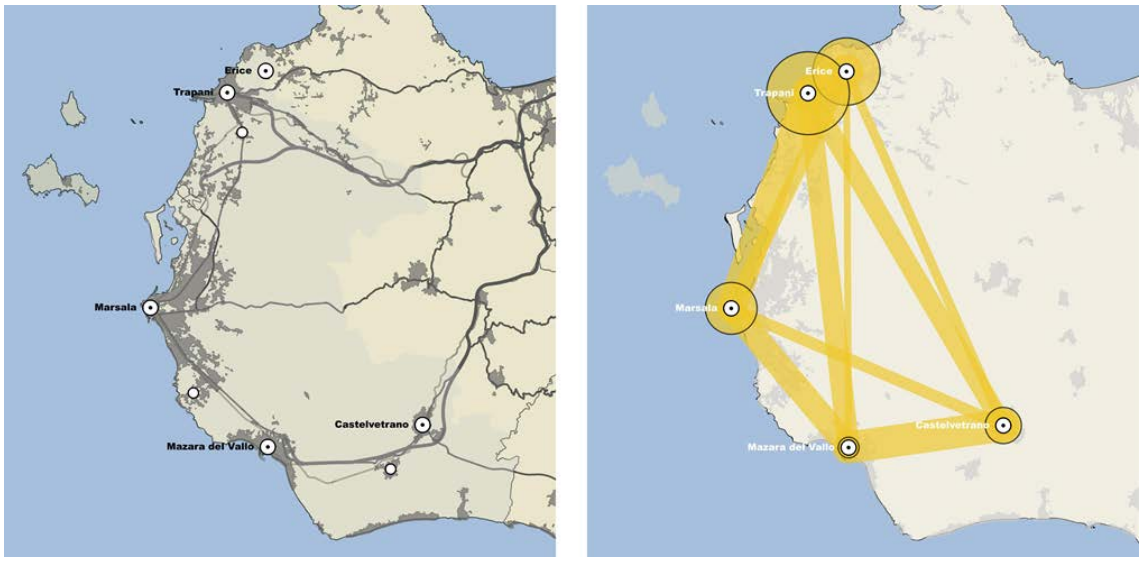

Fig. 3 Urbanisation, transport networks (left) and chart of the systematic movements among the five cities (right) (Source: Authors)

Alongside the movements for work and study reasons we took into consideration also the movements generated in the area by tourist activities. In fact, according to the data released by the Regional Tourism Observatory in 2016, from 2005 to 2015 the five cities are characterized by a considerable increase of tourist flows: +5% in terms of arrivals and +9,4% in terms of attendance, with an average permanence far above the regional level. As it is showed in Tab. 2, tourist flows are not always related to the demographic size of the cities, as in the case of Castelvetrano, where 13 kilometers far from the city centre is located one of the most attractive archeological site of the region (Selinunte). This specific situation has implied for policy-makers to consider sustainable mobility not only as a way to ensure cleaner transports within the urban areas, but also as an instrument to diversify accessibility to the cultural/natural landmarks of the area. As it will be better explained in the following section, therefore, the proposed greenway is constituted by 'urban' and 'suburban' sections. The analysis of the current transport modal split within the five cities clearly represents the distance with what can be defined as a 'virtuous' model of mobility (Bhat, 1995). Like in other southern Italian regions, in fact, the most common means of transport in the area are the private cars: these are preferred by users in the 72% of cases, 58.9% of which as a driver. On average, only 2.9% of trips are made through urban or suburban buses, while trains are used by only 0.4% of the travellers. Although the favourable geographical conditions, bicycle is used on average only for the 0.6% of trips, one of the lowest rate in Italy among the medium-sized cities. On the other hand, surveys made in the cities suggest a great potential for a mobility system based on the bicycle. For instance, in an analysis carried out within the Urban Mobility Plan of Mazara del Vallo, it is argued that the spread of the bicycle as a means of movement might be highly improved only by providing an infrastructure that satisfies the minimum standards of safety and security. In spite of that, the extent of the bike lanes network is extremely poor, as they amount to only 4 kilometers spread over three urban areas (Erice, Trapani, Marsala).

4 THE GREENWAY AS A SOLUTION TO MEET URBAN MOBILITY AND LEISURE

The very low use of bicycle for home-work trips, on the one hand, and the potential users deriving from tourist/leisure activities on the other, clearly justify a significant improvement of bike pathways network in the area. The approach adopted is explicitly addressed to integrate a greenway approach with the promotion of intermodality, a factor that could facilitate the greenway usage to several types of user. This is especially true in the case of the Marsala-Trapani itinerary, both for the advantageous morphologic profile, and for the density of urban/environmental resources that can be found in proximity of the existing transport infrastructures. Given the above mentioned considerations, and the budget availability (around 5.8 millions of euro), the SSUD

action plan has estimated at 26 kilometres the length of new urban cycle pathways to be implemented within the five urban areas. Whether they will be supported by other mobility infrastructures – i.e. intermodal transport nodes – it is expected that the new pathways may lead to an increase of trips by bicycle from the current 0.5% up to 1.5% of the total. In terms of changed modal split, it is expected that the implementation of the mobility part of the strategy could lead to a reduction of around 7% of users of private vehicles for the systematic trips within the urban areas. In the SSUD of Western Sicily, however, urban cycle pathways are understood as part of a broader territorial network to foster sustainable development in the logn term. In fact, the bike pathways being implemented within the urban areas are conceived as sections of a longer green infrastructure whose itinerary has been identified with the aim of creating a network among the resources showed in Fig. 1. Therefore, the bike pathways are divided into 'urban' and 'suburban' sections, whose length is 26 and 70 kilometers respectively. The urban sections are devoted, particularly, to increase the use of bicycle by citizens and to help the waterfront regeneration process. For the first aim, the action plan has allocated financial resources to the implementation of bike-bus-train interchange facilities, as well as the creation of bike sharing services in the city centres. In the suburban sections, the greenway aims to ensure better connections between the urban centres and between the tourist facilities and the cultural/natural sites spread over the territory. Furthermore, since the planned greenway frequently is joined to the railway line and intercepts stations, the strategy aims to promote bicycle-train intermodality. Consequently, infrastructures are conceived to meet demands from a broader range of potential users, such as people using bike for home-work trips, as well as others for leisure and tourist activities. From this perspective, the implementation of new bicycle pathways under the greenway concept within the SSUD of Western Sicily goes beyond the simple aim to improve sustainable mobility in the area. Rather, it is expected the new infrastructure may lead to a reshaping of territorial organisation, creating new grounds for an environment-led polycentric urban development.

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MOBILITY: EXPLORATORY ANALYSIS FOR TERRITORIAL PREFERENCES

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ABSTRACT

Urban mobility is a current challenge on modern life and has its implications not only on time misuse but also on citizens' health. Spending hours of a day on traffic, people interact with the environment they are susceptible to, which implicates on their manner of seeing, enjoying and living a city. To analyze this impact, an exploratory study was developed on the possibilities of using data composition and spatial analysis tools to select and combine main variables in order to diagnose characteristics of urban landscape on Pampulha Region, in Belo Horizonte (MG), Brazil. Territorial Analysis Units (UTA) were delimited and urban data were studied. First, the main characteristics were represented in categories of variables, and then they were recombined by utilizing Multi-Criteria Methods based on Weighted Sum to present results of suitability for walkability. For each step of spatial analysis, were generated Suitability (Multi-Criteria) and Sensitivity (Uncertainties) Evaluation Maps, proving the similarities of areas considered attractive and vulnerable with the goal to refine the partial results and select the main variables related to walkability. The case study presents the most significant characteristics that might be considered when planning quality of life on urban environments.

KEYWORDS:
Multi-criteria Method; Sensitivity Analysis to Suitability Evaluation; Urban Mobility; Urban Landscape; Pampulha Region

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摘要

城市出行是现代生活中我们面临的一个挑战，其影响不仅涉及到时间的浪费，同时也对人们的健康不利。人们每天在交通上花费数小时的时间；他们与居身于其中的环境互动，环境对人们对城市的感知、体验和居住方式也产生影响。以分析这种影响为目的，我们开展了一项探索性研究，探讨使用数据和空间分析工具对主要变量进行选择及组合、以便于判定巴西贝洛哈里桑塔（MG）潘普利亚地区城市景观的特点的可能性。其中，对地域分析单位（UTA）进行了界定，并对城市数据进行了研究。首先，将各种主要特征以不同类别的变量表示出来，然后利用多准则方法、根据加权总将其重新组合，以表示步行适宜性结果。空间分析的每个步骤均会生成适宜性（多准则）和敏感性（不确定性）的评价地图，证明被认为有吸引力和易受伤害的不同地区之间存在相似之处，旨在对空间结果进行修正完善，并选择与步行适宜性有关的主要变量。案例研究提供了在规划城市环境中生活质量时可能纳入考虑的最显著特征。

出行
地域偏好的探索性分析

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关键词:
多准则方法；适宜性评估的灵敏度分析；城市出行；城市景观；潘普利亚地区

1 INTRODUCTION

Urban daily life requires attention to citizen's demands and urban infrastructure available to them. Urban transportation plays an important role when analyzing how much time citizens spend on their everyday life routes. Time spent to go to and to come back from work or school and to do other activities often represents a significant part of the day, and this is an even bigger problem in countries with lack of organized and well distributed public transportation. These facts call attention to how the itinerary influences human health physically, mentally, and emotionally. Issues related to mobility must consider not only the difficulties in daily life as vulnerabilities, but also the quality of the place where people circulate on, because this may be seen as attractiveness and potentiality to urban planning, providing better places and routes to citizens' circulation.

Aiming to comprehend conscious and/or unconscious interactions between citizens and urban landscape and its consequences, the research organized data and produced information about existing infrastructure and visual landscape perception of a case study, using geoprocessing and computing tools. The main objectives were to identify characteristics and phenomena that may configure a landscape as attractive or not for citizens, in the sense of topophilia or topophobia, meaning how people feel about places (Tuan, 1974); and to parameterize its conditions in order to recognize areas which present similar aspects, but are not categorized as attractive and its probable reasons.

The study area chosen was the Pampulha Region (IMG.1), located in the northwest of Belo Horizonte (BH), capital of Minas Gerais state, Brazil. The region has an area of 47 square km, 34 districts and 10 slums, with a population of 187,315 inhabitants and a density of 40.13 inhab./km (IBGE, 2010), characterized by an expressive amount of remaining vegetation coverage that represents 26 km² of the area. Its choice was based on its natural, social and infrastructural characteristics, besides its data availability for the Laboratory of Geoprocessing's researchers due to an agreement with the City Hall.

It is the main destination for open air activities within BH; it is mostly flat and presents relatively low density and traffic jams – distinctively from most parts of the city and favorable for active transportation. Moreover, it is known for tourism activities and recognized by UNESCO as a World Heritage Centre, but still has a mixed land use with diversely residential, commercial, industrial, and institutional areas. In addition, transportation's phenomena occur in Pampulha, configuring interesting challenges to be studied: mobility islands caused by large landmarks as the Pampulha Lake, the Federal University of Minas Gerais (UFMG), the Governador Magalhães Pinto Stadium (Mineirão), the Pampulha Airport, and the BH Zoo; and underexplored walkability, despite its infrastructure and favorable conditions to walk compared to other regions of the city.

2 METHODOLOGY

Aiming to approach distinct methodologies of analyzing the area of study, the research has been developed applying two methodologies whose results will be compared on further studies. The first one, entitled Urban Resources (UR), is based on the main spatial characteristics of the Region and will be the focus of this paper. The second one, entitled Citizens' Perception (CP), considers citizens' opinions about their preferences on walking through the landscape in the Region and will be explained on a future paper.

Studies about the characterization of the area, according to Urban Resources, require the definition of a territorial reference to collect and analyze the data. The chosen method was the Territorial Analysis Units (UTA) that allows the comparison between distinct areas of the Pampulha Region. They were delimited in 5144 UTAs, approximately 1 per lane of road added with a buffer of 15 meters inside lots to capture vegetation or characteristics that are on the front part of the lot and are seen by the walker, composing the landscape. The territorial units were constructed using Voronoi polygons, calculating the area of influence of each track considering the road plus the frontal part of the lots, the first 15 meters.

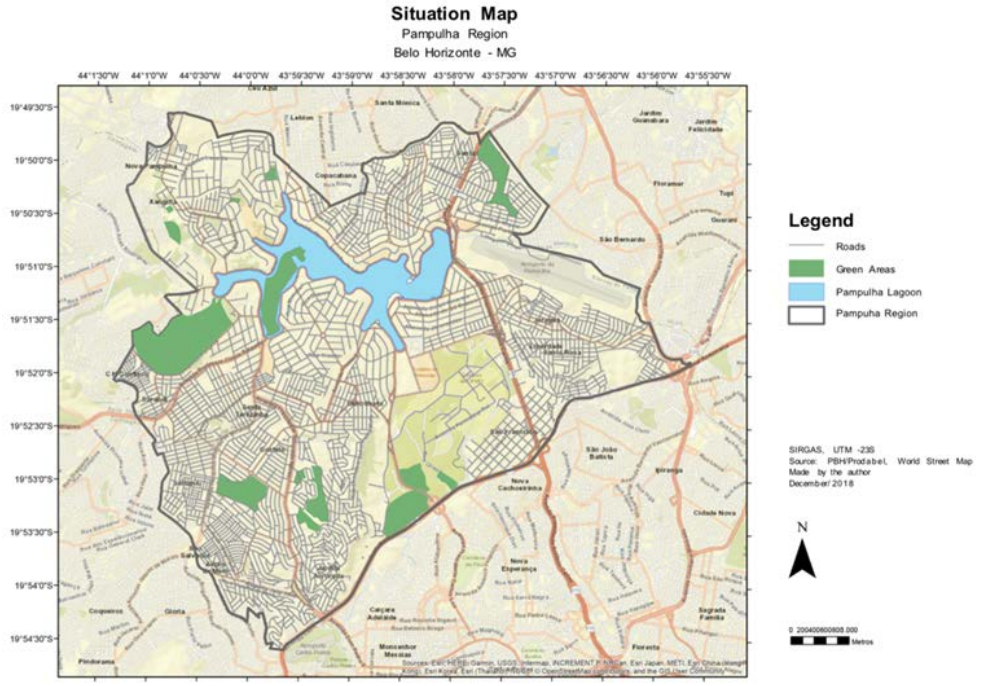

Fig. 1 Pampulha Region Situation Map

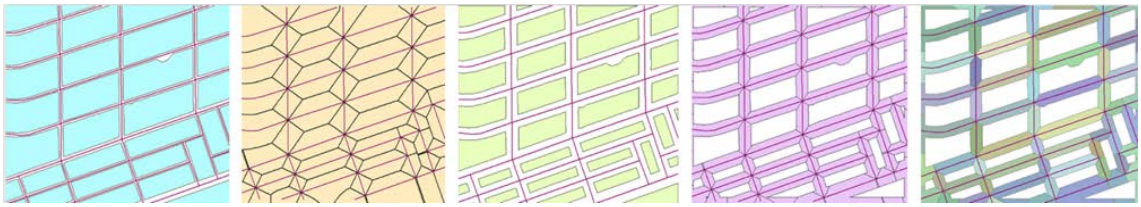

Fig. 2 UTAs construction: from roads and blocks to Voronoi polygons, resulting in one polygon per track

The second step was to define the main variables to be organized, using data provided by the City Hall or producing data by geoprocessing methods. The goal was to decompose reality according to its main characteristics, to compose the variables in principles of spatial analysis to represent the territorial distribution of occurrences or phenomena, and to recompose groups of variables to configure portraits of spatial reality. The method is based on suitability evaluation and studies about uncertainty in the results (Moura, 2007).

The process was oriented by the first part of Geodesign Framework developed by Steinitz (2012), and by studies of uncertainty developed by Ligmann-Zielinska and Jankowski (2012, 2014) according to the methods proposed by Moura and Jankowski (2016), consisting on data assessment based on:

- analyzing data and building Representation Models;
- manipulating information and building Process Models;
- applying knowledge and building Evaluation Models;
- analyzing results and calculating levels of uncertainty on the model.

Thus, the first step was to design Representation Models based on the urban data collected. This data was available due to an agreement, Urban Information Management Group (GGIU), between The Laboratory of Geoprocessing and The City Hall of Belo Horizonte (PBH/Prodabel). To design the Representation Models, a process of structuring and organization of urban infrastructure and environmental data was developed, as listed on the Results section, Tab. 1. Secondly, from these Representation Models and for the Process Models step, 30 (thirty) product files and 19 (nineteen) process-maps were generated, cited on Tab. 1.

Thirdly, to build Evaluation Models, two types of multi-criteria analysis were applied: the Multi-Criteria tool from the ArcGIS software and the Monte Carlo Weighted Sum evaluation tool (Jankowski & Ligmann-Zielinska, 2012, 2014; Moura & Jankowski, 2016). On the first method, all variables had the same weight equal to 5.26, calculated dividing 100 per 19 variables, producing a multi-criteria analysis map.

For the Monte Carlo analysis, the model increases the possibilities of weights to each variable, applying random values in a range defined by the user. Instead of just calculating one result, the model simulates many possible values of weights inside a minimum and a maximum value and compares the results in the many scenarios simulated. In those parts in which the results changed more according to changes in weights randomly selected in a defined range, it is possible to say that the level of uncertainty is higher. Using the tools developed by Jankowski and Ligmann-Zielinska (2014), two maps were produced: an evaluation map, as a suitability map for walkability in the territory, resulted from equal weight values for all variables, and an analysis of uncertainty of the results. Using the Multi-Criteria evaluation method, the Suitability Analysis Map was produced, and using the Monte Carlo method to calculate the uncertainty, the Sensitivity Evaluation Map was generated.

The process categorized each variable as high suitability and low sensitivity, or high suitability and high sensitivity, or low suitability and low sensitivity or low suitability and high sensitivity. The aim was to find results with high suitability and low sensitivity or, at least, high suitability and high sensitivity.

The application used enabled the identification of the most robust variables analysed and the variables that were more related to the level of uncertainty. In this sense, it was possible to identify and eliminate three variables, and to construct a new suitability map using the Multi-Criteria method. They were:

- residence's concentration: it is due to a peculiar characteristic of Pampulha Region that, for example, regions with low density could be great or terrible for walking. It increased the uncertainty levels of this variable;
- roads' Hierarchy: it is a technical nomenclature used by the City Hall that not necessarily represents a road's dimension but it is used to define authorization for land uses, and it was irrelevant for the proposed analysis;
- quantity of Bus Lines: Belo Horizonte's bus system (BRT/MOVE) works with few bus lines riding on main avenues that connect users to transfer stations. Therefore, it shows an inconsistent data comparing main avenues (with few lines but regular services) and ordinary roads (with more lines but not so regular services).

On second round, the Multi-Criteria evaluation tool was applied using only the 16 variables that had robust results. It also generated a Suitability Evaluation Map (based on multi-criteria analysis) and a Sensitivity Evaluation Map (based on Monte Carlo uncertainty analysis).

A third round of the research was also constructed to consider citizens' opinions on multi-criteria analysis. Instead of using same weights to all variables combined, a Delphi Method was applied to take into consideration people's opinion on the importance of each variable, so weights could represent the hierarchy of preferences on walkability. According to the method presented by Dalkey and Helmer (1963) and Moura (2006), 15 volunteers were interviewed, in anonymous schedule, in two rounds: first, they answered a value that express their opinion about the importance of each variable and the average of each one of them was calculated; then, the first average results were presented to them so they could review their votes, for a final average to be calculated and used as final weights on the multi-criteria combination of variables (Tab. 1).

3 RESULTS

To present the results, a comparison table was built (Tab. 1). On the first columns are listed all urban variables used and their correlated process-maps (the transformation of data into information to characterize occurrences and phenomena). The following columns show each methodology applied, variables weights (WT)

used, and, when applicable, its numeric results. The maps generated for each step of Multi-Criteria Analysis Methods are presented on Image 2.

The first step was composed by the calculation of MCA (Multi-Criteria Analysis) using ArcGis tools, considering all 19 variables and applying equal weights to them (5.263%). Since the following step used the same values of the first, but applied on a more qualified methodology - because variables' weights were calculated on a range instead of one unique value –, maps for the first step were not generated due to its lack of robustness.

On the second step, MCA was constructed using Monte Carlo Weighted Sum (Jankowski & Ligmann-Zielinska, 2012, 2014), considering to all 19 variables the same weight of 5,263%, but enlarging the possible weights that were automatically calculated by the tool within a range. As all the variables received the averaged weight, the tool based on the Monte Carlo simulation randomly selected weights within the range of 3,26 to 7,26%, because it represents the standard deviation calculated according to the function of probability density (Moura & Jankowski, 2016).

Along with MCA, the tool calculated the uncertainty based on the variance of the behavior of each variable. The result was that the variables "Bus Lines' Quantity", "Residence's Concentration", and "Roads' Hierarchy" presented the highest variance, which means that their spatial distribution changes a lot in areas that are classified as attractive or vulnerable in the combination of all variables, so they might not be used on further steps. As a result of the second step, those variables were eliminated from the list. The results are on Image 2's first line, maps *a* and *b*, about MCA (Suitability) and Uncertainly (Sensitivity).

The third step was to calculate MCA based on the Monte Carlo simulation again, after eliminating the 3 variables previously cited. The average of weight used was 6.25%, so the tool simulated random possible weights inside the range from 4.25 to 8.25 (according to standard deviation based on function of probability density). Along with the Monte Carlo simulation, the variance composition of variables was calculated, to check if there was still a variable that did not have a robust performance on the integration of all of them, meaning that they changed a lot in areas classified as attractive or vulnerable. As a result, we could observe that all variables were quite robust, and could be kept in the analysis. Only the variable "Concentration of Commerce" had a bigger value, but was still in the limits of robust behavior. The results can be seen on the second line of Image 2, maps *c* and *d*, about MCA (Suitability) and Uncertainly (Sensitivity).

The fourth step had the intention to know people's expectations, on a Delphi Method. Instead of applying the same weight to all variables, the goal was to use the weights according to the citizens' opinions, so that the most important characteristics of the place received higher values.

The interviews with volunteers resulted in values from 1 to 10 to define the importance of the variable (in absolute range), and these values were transformed in relative ones in order to compose a sum of 100%. Using these new values, another integration on MCA was composed, using the Monte Carlo simulation in a range of 2 points less and 2 more based on the value defined by the Delphi analysis. The decomposition of variance was also calculated to check if any variable did not have a robust behavior in the analysis, meaning that they changed a lot on those areas of attractiveness and vulnerabilities produced from the integration of all variables.

As a result, the variable "Permeability Percentage" presented a high variability, which indicated that it could, if reasonable, be further excluded from the list. The results can be seen in maps *e* and *f*, about MCA (Suitability) and Uncertainly (Sensitivity).

Comparing the steps and maps, it is possible to perceive that the analysis acquires refinement by selecting variables that are more related to the quality of urban spaces and walkability. But it is also important to recognize that all maps are very similar, without conflicts of results. It was important to follow all the steps, because the goal was to construct and control the results, improving the analysis, and presenting it as a learning process to researchers, avoiding the "black box" that are quite common in papers.

The quality of results was improved with the partial analysis on each step. In future studies, some of these steps can be eliminated, as we had already understood the partial and final results.

Urban Data	Process Maps	MCA - ArcGIS		MCA - Monte Carlo Weighted Sun + Uncertainty – SASE – 1st round			MCA - Monte Carlo Weighted Sun + Uncertainty – SASE – 2nd round			MCA - Delphi Method			MCA - Monte Carlo Weighted Sun + Uncertainty – SASE – 3rd round		
		Data	WT	Data	WT Range	Variance	Data	WT Range	Variance	Data	WT Absolute	WT Relative	Data	WT Range	Variance
Bus stops	Map of Bus Stops' Concentration	Bus Stops' Concentration	5,26	Bus Stops' Concentration	3,26 to 7,26	-0.065	Bus Stops' Concentration	4,25 to 8,25	0.196	Bus Stops' Concentration	7,8	6,0%	Bus Stops' Concentration	4 to 8	-0.001
Cycle grid	Map of Cycle Grid	Cycle Grid	5,26	Cycle Grid	3,26 to 7,26	-0.127	Cycle Grid	4,25 to 8,25	-0.03	Cycle Grid	8,0	6,1%	Cycle Grid	4,1 to 8,1	0.005
Green areas, urban parks and preservation areas	Map of Permeability Percentage	Permeability Percentage	5,26	Permeability Percentage	3,26 to 7,26	0.125	Permeability Percentage	4,25 to 8,25	-0.049	Permeability Percentage	9,1	6,9%	Permeability Percentage	4,9 to 8,9	0.421
Land densification and building's height	Map of Building's Height Predominance	Building's Height Predominance	5,26	Building's Height Predominance	3,26 to 7,26	0.072	Building's Height Predominance	4,25 to 8,25	-0.06	Building's Height Predominance	7,0	5,4%	Building's Height Predominance	3,4 to 7,4	0.003
	Map of Building's Height Variability	Building's Height Variability	5,26	Building's Height Variability	3,26 to 7,26	0.139	Building's Height Variability	4,25 to 8,25	0.106	Building's Height Variability	5,1	4,0%	Building's Height Variability	2 to 6	0.04
Lots' limits, block contours and land use	Map of Commerce Concentration	Commerce Concentration	5,26	Commerce Concentration	3,26 to 7,26	-0.073	Commerce Concentration	4,25 to 8,25	0.275	Commerce Concentration	7,0	5,4%	Commerce Concentration	3,4 to 7,4	0.002
	Map of Industry Concentration	Industry Concentration	5,26	Industry Concentration	3,26 to 7,26	-0.133	Industry Concentration	4,25 to 8,25	0.068	Industry Concentration	8,7	6,7%	Industry Concentration	4,7 to 8,7	0.001
Public and private equipment for leisure and tourism	Map of Cultural Attractions' Concentration	Cultural Attractions' Concentration	5,26	Cultural Attractions' Concentration	3,26 to 7,26	0.021	Cultural Attractions' Concentration	4,25 to 8,25	0.013	Cultural Attractions' Concentration	8,4	6,4%	Cultural Attractions' Concentration	4,4 to 8,l4	0.005
Public and private urban equipment for health and education	Map of Urban Equipment Concentration	Urban Equipment Concentration	5,26	Urban Equipment Concentration	3,26 to 7,26	-0.00	Urban Equipment Concentration	4,25 to 8,25	0.05	Urban Equipment Concentration	7,5	5,8%	Urban Equipment Concentration	3,8 to 7,8	0.003
Roads' grid, hierarchy, type, width and pavement	Map of Roads' Width	Roads' Width	5,26	Roads' Width	3,26 to 7,26	0.172	Roads' Width	4,25 to 8,25	0.116	Roads' Width	9,3	7,1%	Roads' Width	5,1 to 9,1	0.011
	Map of Roads' Type	Roads' Type	5,26	Roads' Type	3,26 to 7,26	0.121	Roads' Type	4,25 to 8,25	0.008	Roads' Type	8,6	6,6%	Roads' Type	4,6 to 8,6	0.004
	Map of Roads' Paving Type	Roads' Paving Type	5,26	Roads' Paving Type	3,26 to 7,26	0.054	Roads' Paving Type	4,25 to 8,25	0.061	Roads' Paving Type	8,4	6,4%	Roads' Paving Type	4,4 to 8,4	0.093
Topography and roads' grid	Map of Roads' Slope	Roads' Slope	5,26	Roads' Slope	3,26 to 7,26	0.212	Roads' Slope	4,25 to 8,25	0.061	Roads' Slope	8,7	6,7%	Roads' Slope	4,7 to 8,7	0.054
Trees along the roads and in the frontal part of the lots (seen by walkers)	Map of Tree Concentration	Tree Concentration	5,26	Tree Concentration	3,26 to 7,26	-0.038	Tree Concentration	4,25 to 8,25	0.024	Tree Concentration	9,4	7,2%	Tree Concentration	5,2 to 9,2	0.295
Waterbodies	Map of Waterbodies' Visibility	Waterbodies' Visibility	5,26	Waterbodies' Visibility	3,26 to 7,26	-0.018	Waterbodies' Visibility	4,25 to 8,25	0.008	Waterbodies' Visibility	8,5	6,5%	Waterbodies' Visibility	4,5 to 8,5	0.005
Roads' connection and urban services or commerce	Map of Potential Interaction of Urban Nodes	Potential Interaction of Urban Nodes	5,26	Potential Interaction of Urban Nodes	3,26 to 7,26	0.132	Potential Interaction of Urban Nodes	4,25 to 8,25	0.131	Potential Interaction of Urban Nodes	8,8	6,8%	Potential Interaction of Urban Nodes		0.054
Bus lines	Map of Bus Lines' Quantity	Bus Lines' Quantity	5,26	Bus Lines' Quantity	3,26 to 7,26	0.366	x	x	x	x	x	x	x	x	x
Lots' limits, block contours and land use	Map of Residence Concentration	Residence Concentration	5,26	Residence Concentration	3,26 to 7,26	0.411	x	x	x	x	x	x	x	x	x
Roads' grid, hierarchy, type, width and pavement	Map of Roads' Hierarchy	Roads' Hierarchy	5,26	Roads' Hierarchy	3,26 to 7,26	-0.367	x	x	x	x	x	x	x	x	x

Tab. 1 Comparative use of urban data, products generated and results obtained

4 DISCUSSION

When we compare the maps produced, it is possible to understand that the models indicate the same regions as attractive areas and as vulnerable ones. This means that what is recognized as the best region for walkability in terms of technical approach (the first list of variables composed with equal weights) is also the best region in a MCA study with more robust results and going deeper on defining the best variables eliminating those that do not have a behavior that follow the others. The significant difference between the first and the last results is the quality of details and selection of main variables and conditions. Many researchers finish their tasks on the first step, presenting their opinions about the main variables and the final results. Others go further and try to simulate technical opinion but also citizens' way of thinking, constructing different methods of selecting variables and their weights, which can be done by visual driven, data driven or knowledge driven evaluations (Motta et. al, 2017; Moura, 2007; Moura et al., 2018). But the contribution of this paper is to include Sensitivity Analysis in order to recognize which variables really interfere on final results of an integration of values, and to eliminate those that the researcher believes have some importance, but on the case study, they behave in a robust distribution of conditions.

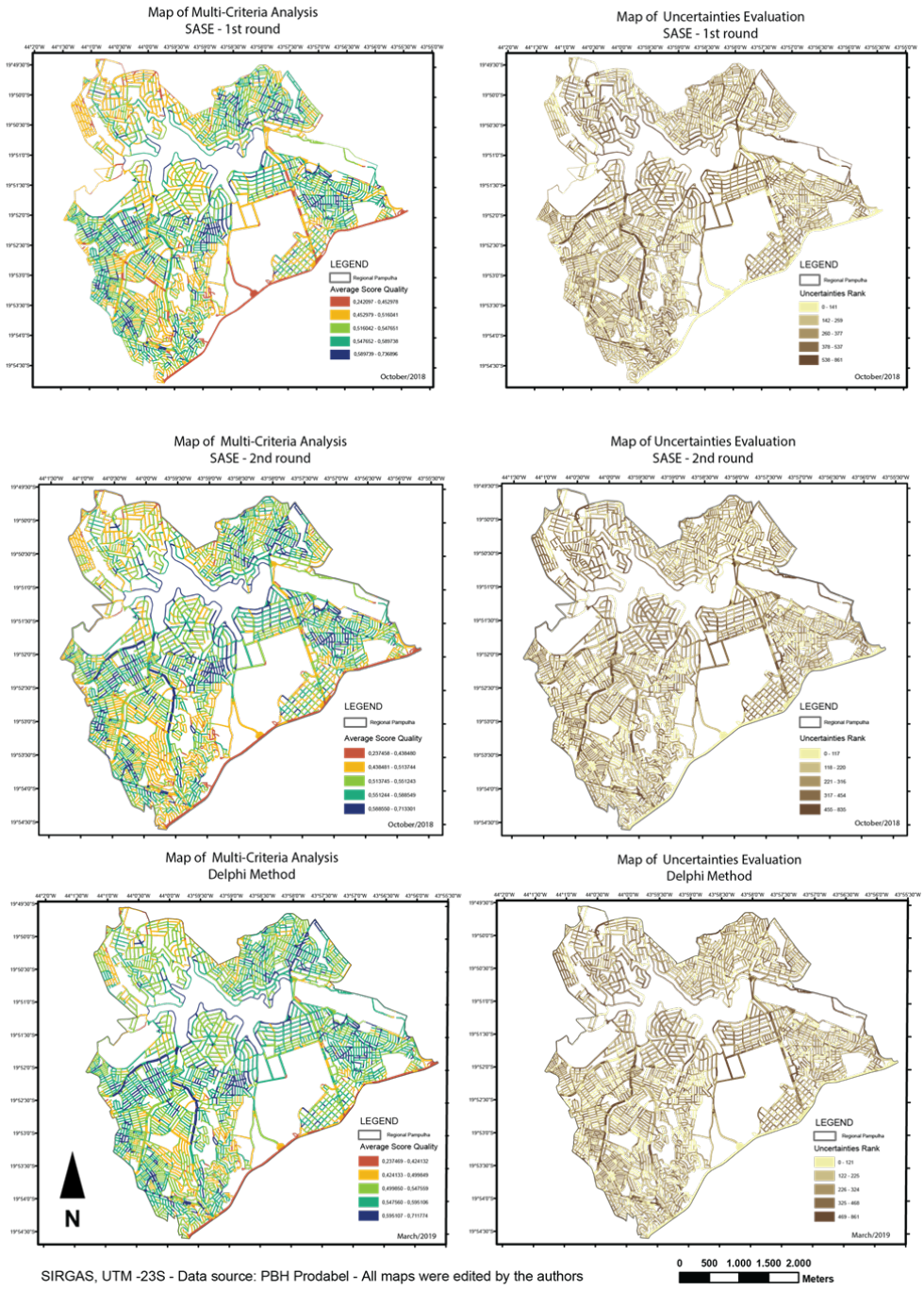

Fig. 3 Multi-Criteria (Suitability) and Uncertainty (Sensitivity) Evaluation Maps

The paper is a step further on multi-criteria analysis, utilizing the SASE methodology (Sensitivity Analysis to Suitability Evaluation) proposed by Ligmann-Zielinska and Jankowski (2012, 2014), with the goal to reduce the initial group of variables to a group of main variables, and also to spatialize uncertainty, to allow researchers to identify places where variables were not the way they expected it to be due to the variation of values. Using this model, it is possible to recognize areas in which there are the most certain attractiveness, areas with questionable attractiveness, and the researcher must go deeper on investigation; areas of certain vulnerabilities, or areas with questionable vulnerabilities that require further studies. The main product of the research so far is the method to go deeper on investigations and to produce steps of spatial analysis that represent knowledge driven (the way experts think) evaluation, to represent citizens' opinion and to compare them with the goal to achieve a first integration of analysis. It is a reproducible and defensible study that has as an output a more qualified spatial analysis. Once this portrait of reality is constructed, it will be time to

compare the results with the methods of CP, organized on web-based interview, with the goal to recognize the main characteristics people elected when they classify a place as presenting good quality of urban landscape and as suitable for walkability. This study is under development. Comparing the results of this step with previous ones, it will be possible to recognize the main variables that really relate to urban quality, and this can be considered on urban and landscape management and planning. Studies like these can be a support to the construction of opinion making, and also to decision making, as people can recognize the main characteristics that promote walkability in an area. The identification of conditions is a way to recognize the best places in the city, but mainly a method to select the main variables that can really interfere in quality of urban walkability and must be considered on plans to qualify places and services on urban areas. It has also a goal to encourage people to think about their common problems, values, and expectations.

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SPORT AND THE CITY, BETWEEN URBAN REGENERATION AND SUSTAINABLE DEVELOPMENT

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ABSTRACT

Sport has always played a prominent role in civil society. Although it has been conceived as a strategic political means throughout history, nowadays sport is considered a positive force in achieving sustainable development. The international documents recognize the contributions it makes to health, education and social inclusion objectives. Anyway, the analysis concerning the relationship between sport and the city should consider both social and physical aspects because people are progressively understanding the city as an ideal palimpsest for sports activities. In this regard, the new phenomenon called "street sport" represents a real challenge for urban governance and planning.

The present study focuses on policies and urban design projects adopted by Cagliari City Council to make Cagliari a great Sports City. Cagliari has unique environmental, geographical and climatic features which allow to promote sport activities throughout the year. Moreover, in the recent years the City has realized significant interventions, both on a local and on a regional scale, as the operation - on going - of refurbishment and reconstruction of the new Stadium.

Within this favourable condition, the authors examine the community perception on benefits that sport provides for human well-being and for city development through the administration of a specific questionnaire. The outcome of this survey highlights to what extent citizens recognize Cagliari as a Sports City and gives interesting suggestions for the definition of shared policies and actions able to assume sport as a lever of sustainable development in the future.

KEYWORDS:
Sport in the city; Sustainable Development, Sport Governance

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介于城市再生和可持续发展之间的体育运动与城市

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摘要

古往今来，体育运动在文明社会中都发挥着突出的作用。虽然在人类历史上，体育运动一直被视作一项重要的政治手段，但现在更多地认为它是一种实现可持续发展的积极力量。国际上通过文件认定了体育运动在实现卫生保健、教育和社会包容性等方面所作出的积极贡献。
无论如何，针对体育运动与城市之间的关系开展的分析，应该考虑社会和物质两方面，因为人们逐渐将城市作为体育活动的一种理想载体。在这方面，“街头运动”这一新生事物是对城市管理和规划提出的真正挑战的典型代表。
本研究的重点是卡利亚里市议会为将卡利亚里打造成著名运动都市而开展的政策和城市设计项目。卡利亚里拥有独特的环境、地理和气候条件，适宜于全年开展体育运动。而且最近几年，这座城市已经在当地和地区一级采取了多项重大干预措施，`以促进在建新体育场的整修和重建工作。
鉴于这一有利条件，本文的作者们通过实施针对性的问卷调查，研究了人们对体育运动为人类福祉和城市发展所带来益处的普遍看法。该调查的结果强调了市民们对卡利亚里作为体育城市的认知程度，并针对共同政策的定义和将体育运动作为未来可持续发展杠杆的行动提出了几项颇吸引关注的建议。

关键词:
城市体育运动; 可持续发展; 体育运动管理

1 INTRODUCTION

Sport has always played a very important role in civil society, becoming progressively a clear expression of different cultures and communities' lifestyles throughout history. It has been conceived as a strategic means to achieve positive and negative political goals since ancient times. As a matter of fact, sport has been assumed as an educational and population control practice but also as a means of propaganda and amplification of the differences between ethnic groups (Balletto & Borruso, 2018b). Several dictatorships have often promoted and sustained sport and the related public events for their self-celebration (Strazzeri, 2018) reaching the maximum epilogue during the Fascist era, up until the Cold War (Balletto & Borruso, 2018a). More precisely, the realisation of sports facilities, as a significant component of the broader "public city", has become a direct expression of political ideologies and aspirations (Balletto & Borruso, 2018b). Nowadays, sport is considered an essential enabler in improving people's health and well-being and in pursuing sustainable development of our cities and regions. The 2030 Agenda for Sustainable Development (UNGA, 2015) states that:

«*37. Sport is also an important enabler of sustainable development. We recognize the growing contribution of sport to the realization of development and peace in its promotion of tolerance and respect and the contributions it makes to the empowerment of women and of young people, individuals and communities as well as to health, education and social inclusion objectives*».

This is a crucial principle which requires to integrate sport into social, economic and environmental urban policies, as well as into urban governance and planning (Lindsey & Darby, 2018).

2 TOWARDS A STRONGER RELATIONSHIP BETWEEN SPORT AND THE CITY

Most cultural principles assumed at the international level to strengthen the relationship between Sport and the City and to highlight the role of sport in pursuing sustainable development have been introduced in Italy to inform the political agenda (Clark et al., 2018). Over the past years, the Italian Government and the CONI (Italian National Olympic Committee) have promoted policies to sustain a comprehensive regeneration of existing sports facilities in peripheral areas, aimed at facing economic and social imbalances as well as urban security issues in deprived areas through specific material and immaterial actions aimed to increase sports activities and the related culture. Anyway, the quest for a closer relationship between sport and the city should be analysed taking into account both social and physical aspects. Nowadays more and more people prefer playing sport according to their personal needs and interests, in different places and at different times, understanding the city as an ideal palimpsest for sports activities (Balletto & Borruso, 2018b). This is a new challenge for urban governance and planning: sport has to be integrated into a broader urban regeneration and sustainable development strategy (CNAPPC, 2015). Urban transformation and regeneration programs, from Mega Events to local and neighbourhood scale, should guarantee a network of spaces and sport facilities able to embrace the new phenomenon called "street sport" (Clark et al., 2018), which stimulates virtuous behaviours and healthy lifestyles (Turner & Carnicelli, 2017). Therefore, the action of sport in urban areas should follow two main directions, not alternative but necessarily complementary. On the one hand, there is certainly space for the large-scale facilities required for the Mega Events which cyclically involve cities and capitals all over the world. Mega Events have often been the occasion to realize great projects (Smith et al., 2019), to allow certain sporting practices and to promote urban regeneration processes - even if not always effective. In this regard, as a matter of example, Italy has been involved in the important operations on stadiums for the World Cup Italia '90. At the same time, it is increasingly important to consider also the local and neighbourhood scale, where existing sport facilities and the still fragmented system of open spaces and green areas could prove to be strategic in defining a network of urban centralities and paths where sport, leisure and cultural activities will reinforce the relationship between sport and the city. According to the theoretical issues above discussed, the objective of the present study is to evaluate the sport attractiveness of Cagliari.

The research consists of two phases, an analytical and a more operational one. The first phase analyzes the peculiar geographical, environmental and climatic features of Cagliari and the framework of public interventions and initiatives carried out to promote sport throughout the City, focusing on two categories of actions:

- material actions - large-scale development projects and operations of redevelopment and enhancement of urban areas and routes;
- intangible actions - public events and bottom-up initiatives.

The operational phase, instead, examines to what extent citizens recognize Cagliari as Sports City and the community perception on benefits that sport provides for human well-being and for city development through the administration of a specific questionnaire.

The metropolitan city of Cagliari, with its system of nodes of various ranks and specializations, connected to the networks of urban parks, squares, boulevard and promenade, appears particularly attractive to the "street sport" (Balletto & Borruso, 2018a). This favourable condition has led Cagliari City Council to recognize the role of sport in the political agenda, promoting and supporting policies hopefully continuing in the future with a stronger participation of the local communities.

3 URBAN POLICIES FOR CAGLIARI-STREET SPORT, BETWEEN LAND AND WATER

Over the last years, Cagliari City Council have promoted a significant program of interventions and initiatives to establish sport as an essential enabler in pursuing sustainable development goals.

The political agenda has been defined according to the cultural principle that sport encourages healthy habits and spreads civic values, thus becoming an essential activity for the personal growth of people (Kiuppis, 2018). Moreover, the local government strategy is based on a deep awareness of the peculiar environmental, geographical and climatic features of the City, which make it an attractive place to play different types of sport and outdoor activities for more than 300 days a year (Comune di Cagliari, Dossier candidatura Città Europea dello Sport, 2017).

Thanks to these favourable conditions, Cagliari has been designated *European City of Sport 2017* by ACES Europe (European Capitals and Cities of Sport Federation), up to become the *Best European City of Sport 2017* (Comune di Cagliari, Report attività, 2017). In addition, Cagliari was a candidate for hosting the sailing regattas of the *2024 Olympic Games* in Rome - candidature resumed – (Comune di Cagliari, Dossier candidatura sede regate veliche). It must be acknowledged that Cagliari has been elected *European City of Sport* also by virtue of the several interventions carried out by the Local Administration, together with private investors, voluntary sports organisations and other associations and sports clubs. The City offers a rich and widespread system of outdoor and indoor sports facilities (over 150) where people can play a variety of activities, including team sports, gymnastics, popular sports such as football, volleyball, basketball, up to niche sports (Comune di Cagliari, Dossier candidatura Città Europea dello Sport, 2017) (Fig. 1). The Municipality represents still today the main public institution involved in the local sports governance and is constantly committed to integrating sport into important urban transformation and regeneration processes, both at a local and territorial scale.

Some strategic operations - completed, under construction or planned -, are worthy of attention (Fig. 1):

- the urban redevelopment of the beachfront (Lungomare Poetto), conceived as a linear promenade for walking, running, cycling, socializing, enjoying the view and for other similar activities;
- the - on going - refurbishment and reconstruction of the new Stadium of Cagliari, a smart sports arena close to the sea and well-connected with the existing urban centralities and networks (Balletto & Borruso, 2018a);
- the redevelopment scheme of the green spaces in the Sant'Elia district, recently become a new urban park (Parco degli Anelli) with areas for sports and leisure activities, fitted with green spaces, pedestrian and cycle paths;

- the Quayside redevelopment project, which consists of a wide pedestrian promenade along the historic port, linked to the promenade along the seafront (Passeggiata Su Siccu);
- the installation of the Luna Rossa' headquarter in the historic port (Molo Ichnusa), in preparation for the 36th edition of the America's Cup

Fig. 1 Cagliari street sport: land and water. The system of sports facilities in Cagliari and the main strategic projects - completed, under construction or planned -. Source: Elaboration of Ginevra Balletto and Giuseppe Borruso, 2018

In addition to these operations, in recent years the Municipality has organized or endorsed several sports events such as *AteneiKa*, *Cagliari respire* and *SoloWomenRun* which are progressively involved more and more people (Comune di Cagliari, Dossier candidatura Città Europea dello Sport, 2017). The significant program of material and immaterial actions carried out has been recently confirmed by the *Il Sole 24 Ore survey - Sportiness index 2018*, referred to the 107 Italian provinces, where Cagliari has reached the third place in the top 20 ranking.

According to the criteria established by the survey, Cagliari is:

- the 2nd in the Category "Sports index" (Indice di sportività);
- the 1st in the Category "Team Sport" (Sport di squadra);
- the 24th in the Category "Individual Sports" (Sport individuali), even if proves to be more attractive to play swimming, tennis, water sports and other indoor sports;
- the 5th in the Category "Sport and Society" (Sport e Società), reaching good performances in the sub-categories of sports and children, sports media and women's sports, while could do something more to improve its position as regard sport and nature and sport and tourism.

4 CAGLIARI AS A CITY OF SPORT? FIRST RESULTS OF A RESEARCH AND FUTURE PERSPECTIVES

A research has been carried on by means of a questionnaire, targeted towards people and organizations involved in sport activities. This has been done in order to better understand the role played by sport in the City of Cagliari, both referred to the lifestyles of the population and to the awareness that the population itself

developed about the importance of playing sport and having an active attitude to improve the quality of life and at the same time boost economic and social development of a territory. The choice of developing a questionnaire on a theme as 'city and sport' was done by two authors of the present paper, aimed at understanding the relationship between city and sport in the perception of big events - as well as ordinary ones - as possible means of urban transformation and regeneration.

The research has been developed following a parallel approach, preparing two questionnaires for the two cities of Cagliari and Trieste. The two questionnaires share a common, general section, and then have been developed with different sections adapted to better fit the peculiarities of two different urban contests: the sailing race 'Barcolana' in the case of Trieste, an event that characterize the city as a major event, and the possible other events to be implemented in the city; the city of Cagliari as 'The City of Wind', with its potential of becoming an attractor for sailing activities, following the fact it hosts the Luna Rossa Team. The questionnaire has been developed by means of a Google Form and distributed over a community of selected users, identified among people active in sport, both as amateur and professionals, and as managers of sporting activities. People were therefore motivated in filling in the questionnaires, and other 300 forms have been collected in the period of time between 9 May 2018 and 30 October 2018.

The majority of respondents are male (more than 60%), born in the City of Cagliari and its hinterland, of an age between 26 and 60 years. Around 80% stated practicing sport activities regularly, mainly individually (67.6%) and as amateurs (48.4%). Team sports and activities practiced by people registered in sport associations follow as preferred way of practicing. It is interesting to observe the preference of people for individual sport activities, demonstrating a growing trend in contemporary society of managing and organizing its own physical, sport activities in an autonomous way, according to particular needs and personal interests, and also, as a possible consequence of the good supply of urban spaces and natural areas - as humid areas and coast areas - suitable for practicing these activities. That seems to be confirmed by analysing the main sports practiced, as Sailing//Windsurf/Kitesurf, Running and similar, following by Bike (road and mountain), Swimming and Soccer. Low percentages have been registered for Body building, Tennis, other water sports, martial arts and Beach tennis. The questionnaire reveals also the weight that sport has in the life of people in terms of time and costs. The time dedicated to sport during the week is on average 2 to 3 hours (31.4%) and among 4 and 5 (34.2%), to reach a timeframe bigger than 6 hours (22.6%). Only 11.8 % of interviewees dedicate less than 1 hour per week to sport. About costs, 37.4% spends more than 500 euro per year, nonetheless a certain number of people seem spending less than 100 euros per year (21.3%). Again, another suggestion to confirm the capacity offered by the city to practice open air sports - namely street sports - and not necessarily in dedicated infrastructures. The parts of the city more directly interested by sport activities and by the related ones have been identified in the Poetto area, in the urban seaside promenade and in the parks (Molentargius, Monte Urpinu, etc.). The questionnaire highlighted also the widespread awareness of the benefits coming from sport events at different scales. The 96% of interviewees declares that sport events are particularly important for the well-being of people and for enhancing the image of the city. Furthermore, more than 80% agrees on the fact that sport plays a relevant role for the economic development of the city. Many respondents agree on the need to extend sport events in time, involving also other parts of the city, other than those favoured and already widely used (Fig. 2).

5 CONCLUSIONS

The present study has assessed the sporting attractiveness of the city of Cagliari.

The results of the questionnaire have confirmed Cagliari as a place that is highly suitable for welcoming the phenomenon of street sport, in line with the findings of the Il Sole 24 Ore survey. Anyway, the challenge is to make the City more sustainable and "fit for sport".

In this regard, some interviewees presented interesting proposals for the future. First of all, the general awareness of the main geographical, environmental and climatic characteristics of Cagliari suggests marketing activities at national and international level to enhance the sports offer in a highly favorable landscape, but also a major integration between sport governance and environmental policies. According to the sub-categories Sport and Nature and Sport and Tourism of the Il Sole 24 Ore survey, Cagliari are ranked 10th and 16th respectively.

This data suggests that new actions are necessary to overcome this gap, even starting from the indications coming from the local community.

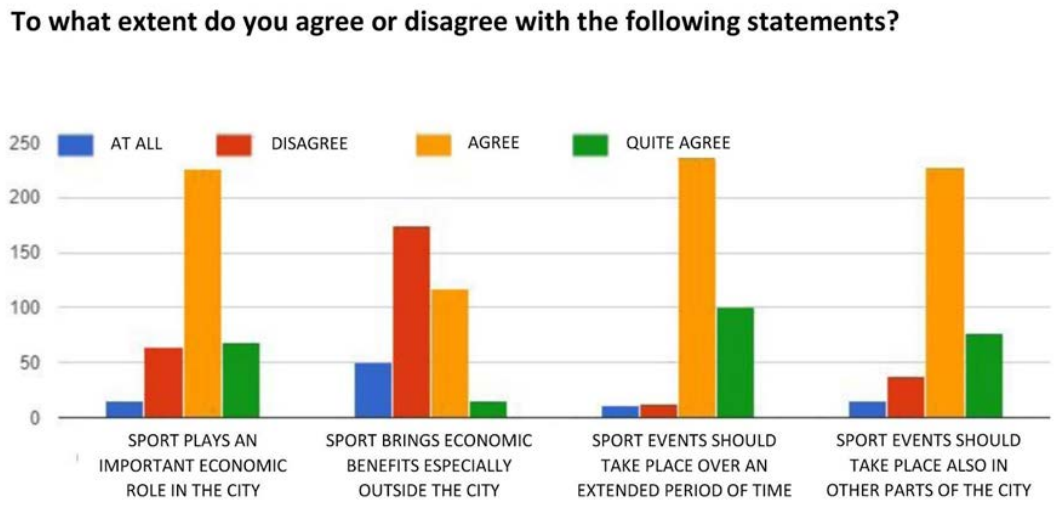

Fig. 2 Perception of interviewees about the economic importance of sport and sport events. Source: Questionnaire developed by Balletto and Borruso, 2018

Other respondents highlight actions to enhance the benefits deriving from the correlation between sport, wellness and social inclusion, such as:

- sports and suburbs;
- redevelop before building new sports facilities;
- make the local community aware of the importance of sport;
- internationalization of sporting events and events.

To conclude, the results of the questionnaire offered important suggestions for the implementation of the program of material and immaterial actions necessary to confirm Cagliari as a city of sport in the near future. In this sense the active involvement of the local community is fundamental to manage and strengthen the sport-city link and to define a shared model of sustainable social, economic and environmental development, as indicated by the Agenda 2030.

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LAND SUITABILITY ASSESSMENT OF GREEN INFRASTRUCTURE DEVELOPMENT

A CASE STUDY OF PENDIK DISTRICT (TURKEY)

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ABSTRACT

Urban green space, an integral part of urban ecosystems, provides important environmental and social services that mitigate environmental problems caused by rapid urbanisation and urban sprawl. Urban planning and policy aim at optimising the benefits obtained from urban green spaces. The analytic hierarch process (AHP) is a commonly used technique for suitability assessment of land uses. The traditional AHP method is criticised for its subjectivity and uncertainty. Considering this, Fuzzy-AHP has been introduced as an advanced methodology in dealing with the uncertainty in the decision making process. In this study, we compared the two methods of AHP and fuzzy-AHP integrated with Geographic Information Systems (GIS) for the suitability assessment of Pendik district, Istanbul regarding green space development. First, criteria and sub-criteria were determined and the corresponding weights were assigned based on literature and experts' knowledge. This is followed by preparation of spatial maps integrated with the corresponding weights and development of final suitability maps in both methods of AHP and fuzzy-AHP. Our results show that high suitability areas are mainly distributed in the southern part of Pendik district around the existing urban green infrastructure. In both maps obtained from AHP and fuzzy-AHP, more than 30 percent of the study area has the potential for green space development.

KEYWORDS:
Urban Green Space; Land Suitability Analysis; AHP; Fuzzy-AHP; GIS; Turkey

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开发绿色基础设施的土地适宜性评估

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摘要

城市绿色空间作为城市生态系统的一个组成部分，为我们提供了能缓解快速城镇化和城市扩张所带来的环境问题的重要环境和社会服务。城市规划和政策的目标，是对城市绿色空间创造的效益进行优化。层次分析法（AHP）是一项常用的土地利用适宜性评估技术。传统的AHP法因其主观性和不确定性而备受批判。考虑到这一点，我们引入了模糊层次分析法，作为处理决策过程不确定性的一种更高级的方法。本研究对比了两种方法：AHP法和模糊AHP与地理信息系统（GIS）相结合的方法，将其分别用于评估伊斯坦布尔彭蒂克区的绿色空间开发适宜性。首先，基于文献和专门知识，确定一级和二级准则，并指定相应的权重。然后，根据相应权重绘制空间地图，`并用AHP和模糊AHP法分别绘制最终的适宜性地图。我们的研究结果显示，适宜性较高的区域主要分布在彭蒂克南部现有城市绿色基础设施的周边地区。在通过AHP法和模糊AHP法分别制成的两个地图上，具有绿色空间开发潜能的研究地区都超过30%。

关键词:
城市绿色空间；土地适宜性分析；层次分析法；模糊层次分析法; 地理信息系统; 土耳其

1 INTRODUCTION

Since cities face with rapid urbanisation that is associated with urban sprawl and the decrease of urban green space, there is increased pressure on urban ecological environment. Urban green spaces, an important part of urban ecosystems, provide significant benefits that contribute to preservation of biodiversity and quality of life in urban areas (Sreetheran, 2017; Uy & Nakagoshi, 2008). Urban green spaces generally improve urban environmental conditions by regulating temperature and microclimates, sequestering CO_2, reducing air pollution and noise, maintaining diversity, and providing recreational and social values (Armson, Stringer & Ennos, 2013; Hamada & Ohta, 2010). Development of urban green spaces has become an integral part of any urban policy and city planning. Determining suitable locations for urban green infrastructure (UGI) development is therefore an important task to support urban policy and planning aimed at improving urban ecological environment (Li et al., 2018; Zhou & Wang, 2011).

Land suitability analysis specifies the degree of land usefulness for potential land development by land requirement and qualities (Malczewski, 2004). Multi-criteria evaluation (MCE) method that is integrated with Geographical Information System (GIS) has been increasingly used for land suitability analysis. MCE focuses on different criteria such as bio-physical, socio-economic and policy related factors in decision making process to assess different land problems considering the alternatives (Pramanik, 2016). GIS is a technique to investigate the geo-spatial data with great flexibility and high precision in the land suitability assessments (Malczewski, 2006). Therefore, the integrated methodology where the MCE method is integrated with GIS involves utilisation of geographical data and assessment of various criteria based on decision makers preferences and specified decision rules (Malczewski, 2004).

Analytic hierarchy process (AHP), first developed by Saaty (1980), is a multi-criteria decision making model that composes complex decision making problems of land management (Malczewski, 2006). In the traditional AHP, the weight of importance of different land uses is determined based on pairwise comparisons of different parameters considered in the analysis. AHP is criticised due to its inability to deal with complexity and uncertainty of the evaluation parameters. Regarding real world problems, some of the decision data can be precisely assessed while some others cannot. In Leung and Chao's (2000) explanation, the uncertainty in preference judgements give rise to uncertainty in the ranking of alternatives and difficulty in assessing consistency of the preferences. Fuzzy-AHP has been introduced as an advanced methodology in dealing with the uncertainty and vagueness of the mathematical terms developed in the decision making process. The current study focuses on comparison of the two MCE methods (i.e. AHP and fuzzy-AHP approaches) integrated with GIS to assess the suitable sites for urban green infrastructure (UGI) development in Pendik district which is located in eastern part of Istanbul, Turkey. Considering adverse impacts of rapid urbanisation and high rates of population growth observed in Pendik, it is vital to assess and plan suitable sites for green space development in the area.

2 METHODOLOGY

2.1 SPECIFICATIONS AND ASSESSMENT OF CRITERIA

To acquire suitable land for amenity-led growth, local environmental and socio-economic conditions are essential factors. Opportunities for UGI development are related to environmental features like geophysical limitations, topographical and climatic features, proximity to lakes and rivers, and attractive landscapes due to their aesthetic value (Van Berkel & Verburg, 2012). Physical features can become amenities through the provision of protected areas, and the construction of urban green facilities that are linked to local demand for recreation and leisure activities (Van Berkel et al., 2014). Transportation infrastructure that increases accessibility to amenities is also of great significance. Therefore, recent land-use/cover and other

environmental and geophysical data are required for the identification of suitable amenity-led growth (Pramanik, 2016).

To identify the most suitable sites for green infrastructure development, the study focuses on 5 main criteria and 17 sub-criteria which were prepared as GIS-based layers. The selection of the criteria is based on a comprehensive literature review, expert opinions and specific conditions observed in the region (Tab. 1). The ranks of each criterion were determined based on the literature provided in the last column of Tab. 1 by using (1-7) scale. Weighting to sub-criteria was performed based on pair-wise comparison technique in AHP and using fuzzy-AHP values.

Weighting in analytic hierarchy process

As a decision analysis tool, AHP was first developed by Saaty (1980) for analysing complex decisions involving different criteria. In AHP, a matrix is generated as a result of pair-wise comparisons which help decision makers to assign different levels of importance of factors included in the analysis. The assigned ranks (1-7) indicate the strength and dominance of the criterion (Tab. 2). There are four steps for the calculation of weights in pair-wise comparison matrix (PCM) (Zolekar & Bhagat, 2015): (1) formation of judgements, (2) calculation of assigned ranks, (3) development of normalised pair-wise comparison matrix, and (4) calculation of weights. Accordingly, the cell values of PCM are divided by sum of each column and averaged across rows to calculate weights for each criterion. Consistency ratio (CR) is used for the determination of accuracy of the calculated weights (Saaty, 1980). In Saaty's (1980) explanation, the CR has the upper limit value of 0.10 implying that the values greater than 0.10 are inconsistent. In the present analysis, the CR is 0.07 therefore we concluded that there is no inconsistency of the judgements and the selected criteria are acceptable.

Weighting in fuzzy analytic hierarchy process

There is vast literature indicating that comparison ratios are imprecise judgements. According to Leung and Chao (2000), the fuzziness and vagueness in the preference judgements of decision makers in conventional AHP approaches leads to uncertainty in the ranking of alternatives, and causing difficulty in determining consistency of preferences. Fuzzy-AHP has been developed as an alternative to traditional AHP approach is considered as an advanced analytical method. According to fuzzy theory, any field X and theory Y can be fuzzified by replacing the concept of a crisp set in X and Y by that of a fuzzy set (Isabels & Uthra, 2012). A fuzzy set can be defined by assigning each individual in the universe of discourse a value representing its grade of membership in the fuzzy set. The fuzzy membership function is defined from X to $[0,1]$.

Fuzzy-AHP is based on a series of pair-wise comparisons indicating the relative preferences of between pairs of criteria in the same hierarchy. Using triangular fuzzy values for the linguistic variables, the fuzzy pairwise comparison matrix $X = (x_{ij})$ is constructed. The ratio for the pair-wise comparisons indexed i and j can be modelled through a fuzzy scale value.

Each element of X is a fuzzy number defined as:

$$X = (x_{ij}(l_{ij}, m_{ij}, u_{ij}))$$

Where:

- l is the lower limit value;
- m is the most possible value;
- u is the upper limit value.

MAIN CRITERIA	SUB-CRITERIA	SCORE	REFERENCES
Geo-physical			
Slope (degree)	2-5	7	Li et al., 2018; Dagistanlı et al., 2018
	5-10	6	
	10-15	5	
	15-20	4	
	>20	3	
Elevation (m)	0-100	7	Bunruamkaew & Murayama, 2011
	100-300	4	
	>300	1	
Aspect	135-225	7	Mahdavi & Niknejad, 2014; Pramanik, 2016
	45-135	5	
	225-315	3	
	315-45	1	
Erosion risk	Very low or low	7	Dagistanlı et al., 2018; Piran et al., 2013
	Moderate	5	
	High	3	
	Very high	1	
Land capability	Hard rocks	7	Peng et al., 2016; Piran et al., 2013
	Rocks	6	
	Soft rock, very dense soil	5	
	Stiff soil	4	
	Soft soil	3	
	Others	1	
Accessibility			
Distance from highways (m)	<2000	7	Bunruamkaew & Murayama, 2011
	2000-5000	4	
	>5000	1	
Distance from roads (m)	<200	7	Yousefi et al., 2016
	200-300	6	
	300-400	5	
	400-500	4	
	500-600	3	
	600-700	2	
	>700	1	
Distance from bus stops (m)	<300	7	Yigitcanlar et al., 2007
	300-400	6	
	400-800	5	
	800-1000	4	
	1000-1200	3	
	>1200	2	
Distance from metro stop (m)	<600	7	El-Geneidy et al., 2014
	600-800	6	
	800-1000	5	
	1000-1200	4	
	1200-1400	3	
	>1400	2	
Blue and green infrastructure			
Distance from reservoir (m)	<250	7	Dagistanlı et al., 2018; Kienast et al., 2012
	250-500	6	
	500-750	5	
	750-1000	4	
	1000-1500	3	
	1500-2000	2	
	>2000	1	
Distance from water courses (m)	<50	7	Kienast et al., 2012; Li et al., 2018
	50-100	6	
	100-300	5	
	300-500	4	
	500-700	3	
	700-1000	2	
	>1000	1	
Distance from coastline	<50	7	Li et al., 2018
	50-100	6	
	100-300	5	
	300-500	4	
	500-1000	3	
	1000-2000	2	
	>2000	1	

MAIN CRITERIA	SUB-CRITERIA	SCORE	REFERENCES
Distance from urban green (m)	<100	7	Li et al., 2018; Morckel, 2017
	100-300	6	
	300-500	5	
	500-1000	4	
	1000-1500	3	
	1500-2000	2	
	>2000	1	
Urban land			
Distance from commercial centers (m)	<250	7	Malmir et al., 2016; Zhang et al., 2013
	250-500	6	
	500-1000	5	
	1000-1500	4	
	1500-2000	3	
	2000-2500	2	
	>2500	1	
Distance from high density residential centers (m)	<100	7	Dagistanlı et al., 2018; Yousefi et al., 2016
	100-150	6	
	150-200	5	
	200-250	4	
	250-300	3	
	300-400	2	
	>400	1	
Vegetation			
Land use/land cover	Natural vegetation	7	Li et al., 2018, Mahdavi & Niknejad, 2014
	Water bodies	6	
	Forest	4	
	Agricultural land	3	
	Urban land use/ cover	2	
Agricultural land suitability	Very high	6	Steiner et al., 2000
	High	5	
	Moderate	4	
	Low	3	
	Very low	2	

Tab. 1 Weights of the criteria and sub-criteria in the study

RELATIVE IMPORTANCE	DEGREE OF PREFERENCES
1	Equal
3	Moderate
5	Strong
7	Very strong
9	Extreme
2, 4, 6, 8	Intermediate
Reciprocals	Less importance

Tab. 2 The rating scale for pairwise comparison matrix. Source: Saaty, 1980

Given the fuzzy theory, the membership function is defined as follows:

$$\mu(x) = \begin{cases} (x-l)/(m-l) & \text{if } l \le x \le m \\ (u-x)/(u-m) & \text{if } m \le x \le u \\ & \text{Otherwise} \end{cases} \quad (1)$$

The pair-wise comparisons are described by values that are converted into the following scale given in Tab. 3 including triangular fuzzy numbers (Fig. 1) developed by Chang (1996). More details on fuzzy theory can be seen in Chang (1996).

TRIANGULAR FUZZY SCALE	FUZZY NUMBERS	DEFINITION
(1,1,1)		Equal (E)
(1/2,1, 3/2)	1	Equally important (EI)
(1, 3/2, 2)	3	Weak (W)
(3/2, 2, 5/2)	5	Fairly strong (FS)
(2, 5/2, 3)	7	Very strong (VS)
(5/2, 3, 7/2)	9	Absolutely more important (AI)

Tab. 3 Triangular Fuzzy values used in the study. Source: Mahdavi & Niknejad, 2014

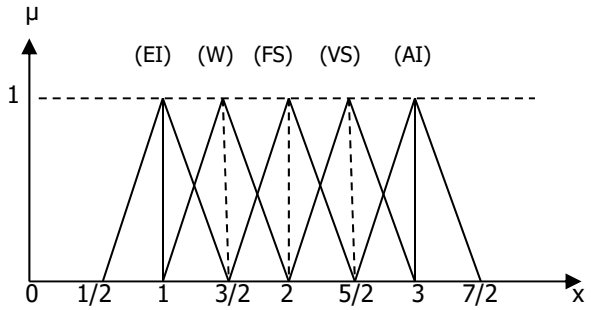

Fig. 1 Triangular fuzzy values representing the weight of each criterion. Source: Adopted from: Mahdavi & Niknejad, 2014

2.2 SUITABILITY EVALUATION

Following the development of final weights by AHP and fuzzy-AHP techniques, the suitability index was computed based on the sub-criteria considered in the analysis (Tab. 1). The suitability index was computed through weighted linear summation of different layers as shown in eq. (2).

$$S = \sum_{j=1}^{n} W_i R_{ji} \tag{2}$$

Where:

- S is the suitability score;
- n is the number of factors considered in the analysis;
- W_i is the weight of criterion i which was computed by using the AHP and fuzzy-AHP methods;
- R_{ji} is the value of pixel j in the map of sub-criterion i.

In our case, the value of the suitability score, S, ranges between 2 and 7 where a value close to 2 represents unsuitable land while 7 indicates extremely suitable. Arc GIS 10.4 model builder tool was used to develop a model of the green infrastructure suitability.

3 RESULTS

3.1 AHP AND FUZZY-AHP WEIGHTS

The weights of the sub-criteria obtained from the AHP and fuzzy-AHP methods are presented in Tab. 4. It can be noted that in AHP urban green infrastructure, current land use/cover and agricultural land suitability are the most effective criteria while physical attributes i.e. aspect, elevation and slope are the least effective ones. In fuzzy-AHP, urban green infrastructure, agricultural land suitability and land capability are associated with the highest weights; and similar to AHP, physical attributes are associated with the lowest weights. The ranks listed in Tab. 4 are relevant with the findings of the literature (Tab. 1).

CRITERIA	SUB-CRITERIA	AHP WEIGHTS	FUZZY AHP WEIGHTS
Geo-physical attributes	Aspect	0.021	0.016
	Elevation	0.02	0.011
	Slope	0.018	0.010
	Land capability	0.082	0.114
	Erosion risk	0.098	0.035
Accessibility	Distance from highways	0.03	0.029
	Distance from roads	0.028	0.023
	Distance from bus stops	0.044	0.056
	Distance from metro stops	0.039	0.052
Green and blue infrastructure	Distance from reservoirs	0.048	0.067
	Distance from coastline	0.047	0.064
	Distance from water bodies	0.048	0.067
	Distance from urban green areas	0.168	0.127
Urban land	Distance from industry/commerce	0.045	0.059
	Distance from high density residential areas	0.032	0.032
Vegetation	Current land use	0.12	0.113
	Agricultural land suitability	0.113	0.126

Tab. 4 Weights of sub-criteria for urban recreation land suitability evaluation

3.2 LAND SUITABILITY FOR GREEN INFRASTRUCTURE DEVELOPMENT

According to each criterion considered in the analysis, a map was prepared using the GIS software. Each GIS layer was classified following the classification of the related criterion provided in Tab. 1 and these are presented in Fig. 2. As described in Tab. 1, the highest suitability value is assigned for the most suitable class. For instance, in the case of slope, the slope lower than 5 is assigned with the highest suitability value. The maps in Fig. 2 were integrated using the corresponding weights with the application of weighted linear combination technique (eq. 2). Regarding final suitability, two different suitability maps were developed using the AHP and fuzzy-AHP methods. The suitability maps are provided in Fig. 3.

The results indicate that according to the AHP method, 2% of the area is highly suitable, around 15% is moderately suitable; 19% is marginally suitable and the rest has either low or very low suitability (Tab. 5; Fig. 3a). There is no high suitability class in the map produced from fuzzy-AHP method. Moderate suitability is 10% and marginal suitability is around 23% and the rest is lowly suitable for green infrastructure development (Tab. 5; Fig. 3b).

The results show that about 89% of pixels of the two maps were classified similarly. The results also indicate that more than half of the total area is classified as low suitability or very low suitability in both of the maps presented in Fig. 3. Around 35% of the total land is classified as suitable and these are mostly located in the southern part of the Pendik Region.

4 DISCUSSION AND CONCLUSION

In this study, land suitability for urban green infrastructure was assessed using AHP and fuzzy-AHP methods integrated with GIS. Seventeen factors including geo-physical characteristics, accessibility, blue and green infrastructure, urban land and vegetation were selected for the land suitability analysis. The weights of each sub-criterion were determined by using AHP and fuzzy-AHP methods separately. Two different land suitability indexes were calculated using the weighted additive combination model. Our findings from the suitability analysis are in line with the actual green infrastructure map in that main part of green infrastructure are located in highly and moderately suitable sites.

AHP is an example of multi-criteria decision making methodology that has been effectively used in multiple criteria problem solving and decision making. Decision making problems may contain socio-economic, physical and political factors requiring linguistic variables for multi-criteria decision assessment. In traditional AHP approach, numerical values of linguistic variables are used for the assessment of the subject criteria included in the analysis. The fuzziness and vagueness in the decision making process requires the use of fuzzy values.

Therefore, besides traditional AHP, we also used fuzzy-AHP approach for weighting the criteria that explain green infrastructure suitability in Pendik district. The study, in fact, evaluates and compares the results obtained from suitability analysis using AHP and fuzzy-AHP approaches. The AHP method had advantages and limitations: The method is flexible and can be integrated with different techniques such as linear programming, fuzzy logic etc. This makes it easier for the users to benefit from extensive options and achive the desired goals by more efficient means. However, there is a drawback of the methodology as it requires a questionnaire survey and expert opinions to conduct the measurement of the relative weights which makes the method more time consuming regarding the technical applications.

Further limitations of the method include insufficient knowledge for the area of interest, the reproducibility of the results and subjectivity of the weighting of the variables (Park et al., 2011). As described by Park et al. (2011) and Xu et al. (2011), there are alternative methods for the suitability assessment of land use development including frequency ratio (FR) model, logistic regression (LR), artificial neural network (ANN), and back-propagation neural network (BPNN) model. The FR model is simple as the calculation process and the inputs are easy to understand and the significance of factors explaining land use growth can be easily interpreted. The method is less time consuming in technical applications. The LR approach makes it possible to analyze the relationship between land use growth and its determinants quantitatively. To constract the underlying statistical relationship, the data in GIS environment needs to be converted to comply with the needs of the statistical program. The existence of big data may limit the performance of the statistical programme as it may not work well.

The ANN and BPNN models provide an improvement over the LR model as they make it possible to have more accurate analysis with a few training dataset. However, the models have some drawbacks such as difficulty in understanding the computation process, and the long calculation times and big volumes of calculation, which makes it less suitable for technical applications. Given this framework on the applications of alternative methodologies in UGI suitability assessment, we suggest the application of these methodologies using our structured data as a future research. This will allow us to compare the results of this work with those obtained from alternative approaches. From our findings we note that despite the differences in the methodology used for weighting the criteria, there is little difference in the weights obtained from AHP and fuzzy-AHP. Urban green infrastructure, agricultural suitability, current land use/cover and land capability were assigned with the highest weights whereas physical characteristics indicated the lowest weights. Overall, the weights of urban green infrastructure, agricultural land suitability, current land-use/cover and land capability accounted for almost half of the total weights assigned to sub-criteria. This has influenced the final suitability maps in that there is little difference in the suitability classifications obtained from AHP and fuzzy-AHP approaches. The results indicated that there is almost 90% coincidence regarding the suitability classes of the two maps of AHP and fuzzy-AHP. In the AHP, moderate and marginal suitability classes cover more than 40% of the area whereas using the fuzzy-AHP approach the study area results to be less suitable for green infrastructure development. According to the two maps produced, the southern part of the study area, along the existing urban green infrastructure corridor, is found suitable for future land development.

The site suitability maps obtained in this study are effective in assessing green infrastructure potential of the study area; and therefore can be utilised by local authorities and planners in their decision making and planning for the future site developments. Considering that there are small differences in the criteria weights obtained from AHP and fuzzy-AHP, for easiness of computation, we recommend using the AHP approach for the suitability assessment of green infrastructure development in Pendik district.

If the difference is higher concerning the AHP and fuzzy-AHP weights resulting in considerable differences in the suitability classifications in the maps, the use of fuzzy-AHP is recommended. Determination and assessment of the criteria for land suitability analysis can be affected from the differences observed between the evaluators e.g. experts, planners, policy makers and their characteristics. For instance, a pessimistic evaluator may not give any point more than five to assess a criterion; by contrast others may give more than

five even though it is irrelevant. This implies that there is fuzziness in the decision making process and fuzzy-AHP method can be effectively used to deal with the issue of fuzziness. Therefore, the proposed methodology of fuzzy-AHP is promising for land suitability assessment not only for green land development but also for other land uses. Apart from the weightings we applied in the AHP process, there are different approaches for the application of weightings and overlaying of GIS layers for developing the suitability map and we suggest to use them in the future research to compare the findings from current study. These include: Boolean overlay, Weighted Linear Combination (WLC) and Ordered Weighted Avaraging (OWA). According to the Boolean method, all the criteria are combined by logical operators such as intersection (and) or union (or) to produce discreate Boolean maps. WLC is an aggregation method where the factors are standardised to a common numeric range and then combined by weighted averaging.

The OWA method involves two different sets of weights: criterion imporatance weights and order weights. Through changing the order weights, it provides flexibility to develop a complete range of decision support maps (including cases of Boolean approach and WLC) and large variety of decision strategies (Romano et al., 2015). The details of these three approaches are provided in Romano et al. (2015).

The application and implementation of suitability analysis for the UGI development is important for the preservation of ecosystems and their functions as well as the structure of the landscape. It is therefore vital to construct such a conceptual framework and to have analysis of quantitative research to be performed for each individual green space in our case study area. As argued by Hobbs and Saunders (1990), preserving individual green space is a temporary solution and without continuity and connectivity of green spaces through the creation of corridors and urban greenways, isolation and loss of genetic diversity is inevitable.

This has not been considered in the current plans and applications in our case study area which resulted in green spaces be more fragmented and isolated. This would lead to reduction in green spaces and the quality of ecosystem services where urban environmental issues will become more serious.

The combination of different green spaces to construct a green space network is therefore highly significant in the UGI planning considering that it is difficult to use one or few of the green spaces to maintain all the benefits of greening in urban areas (Uy & Nakagoshi, 2008). Such comprehensive green space framework can constract a theoratical basis for the practices and applications of organising UGI at different scales aiming at supporting a number of key landscape ecology requirements in our study area.

		SUITABLE AREAS (USING AHP)			SUITABLE AREAS (USING FUZZY-AHP)		
SUITABILITY	SUITABILITY SCORE	TOTAL PIXELS	AREA (sq. KM)	AREA (%)	TOTAL PIXELS	AREA (sq. KM)	AREA (%)
Very low	2	44309	39.88	22.41	38798	34.92	19.62
↓	3	87475	78.73	44.24	94532	85.08	47.81
↓	4	37066	33.36	18.75	44608	40.15	22.56
↓	5	28843	25.96	14.59	19775	17.80	10.00
High	6	20	0.02	0.01	0	0	0

Tab. 5 The area and percentage of different suitability classes developed from AHP and fuzzy-AHP methods

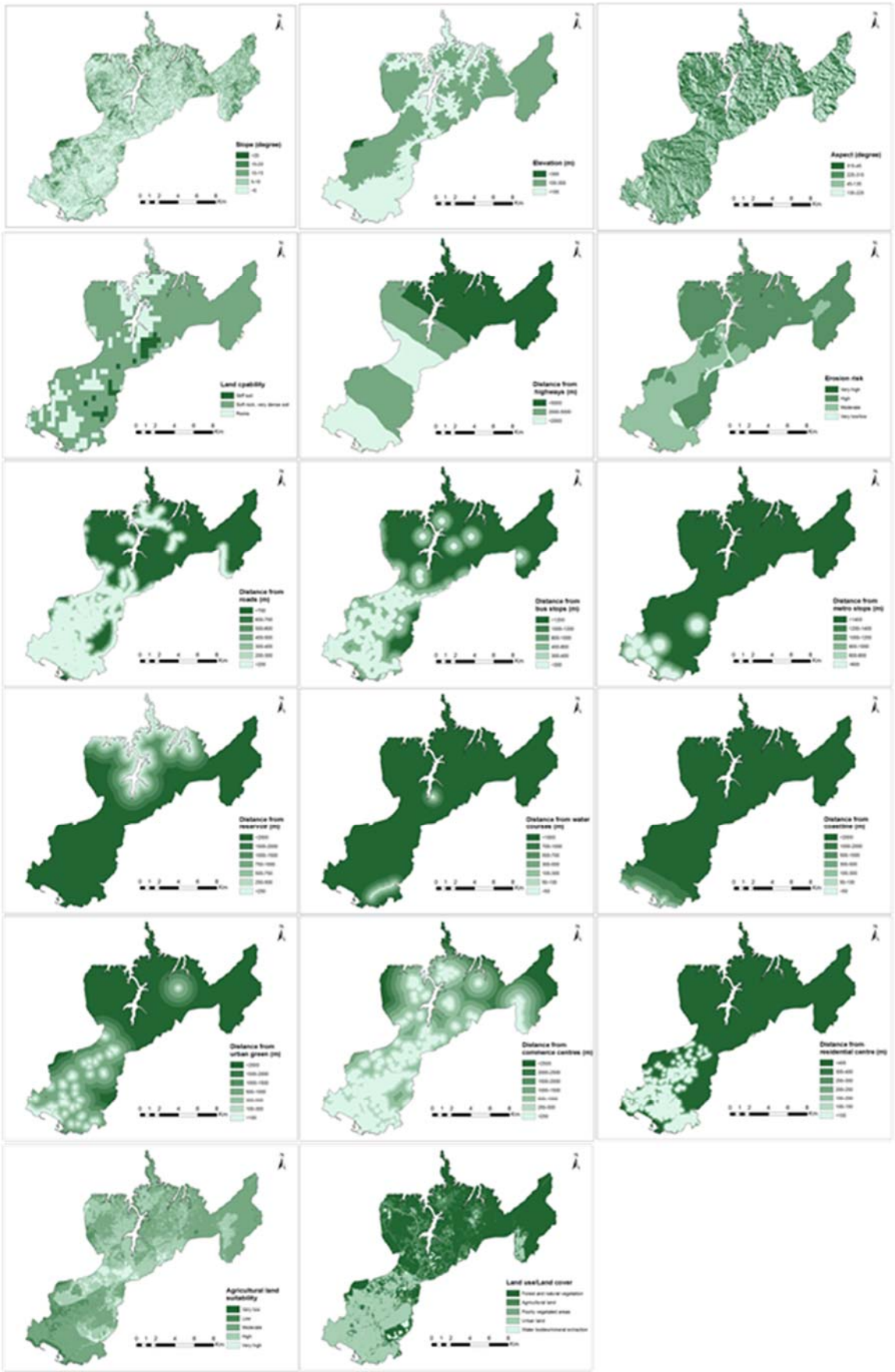

Fig. 2 Suitability value maps for each criterion

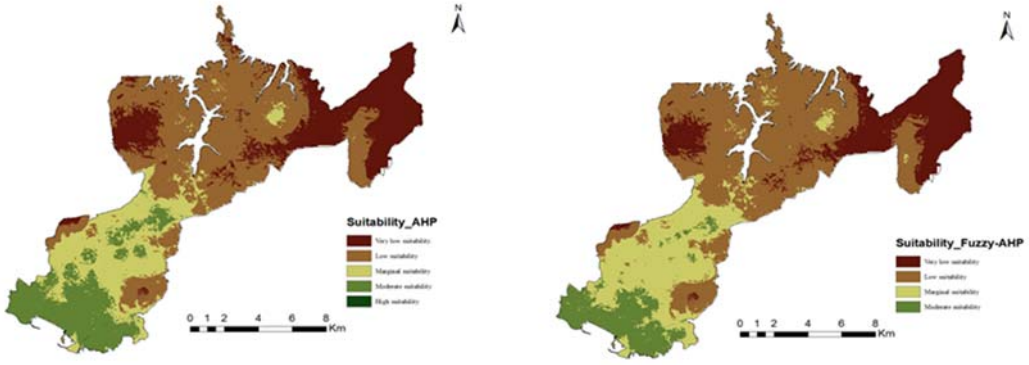

Fig. 3 Suitability maps AHP (a) left; Suitability maps Fuzzy-AHP (b) right

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THE PROMINENT VALUES OF THE MUSTAPHA PACHA HOSPITAL OF ALGIERS AT DIFFERENT SCALES

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ABSTRACT

Mustapha Pacha healthcare facility is one of the most important structure of the sanitary history in Africa. Its stratification goes back to the 19th century. Both of its location in the urban heart of the capital of Algeria and its architectural composition are strategic characteristics of its longevity. But in 2015, some political will pointed out the necessity to demolished the entire hospital. A Utopia due to the complexity of the structure and to economic issues. The study aims to reveal the different heritage scale values of the hospital which characterize it as a preserved and as a functional hospital. Those values are part of the urbanity of the city, its architectural criteria and the medical history. Multi-scalar values are the urban value, the architectural value, the collective value, the scientific value, and the value of belonging. The results aim first to point out the importance of Mustapha Pacha healthcare facility as a building heritage due to its contribution to architectural, human, medical, surgical and technical development. Secondly, it exposes healthcare facilities possibility to be valorized and protected as a built heritage. It also has direct practical implications such as to be an academic base for future researches aiming to understand 20th century healthcare facilities organization and values in general and the Mustapha Pacha hospital as a specific architectural object. The regrouped information is also a deep data collection never done before in order to understand the hospital and can promote heritage' file submission proposition

KEYWORDS:
Healthcare facility; Urbanity; Values; Sustainability

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阿尔及尔穆斯塔法•帕查医院在不同尺度下的重要价值

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摘要

穆斯塔法•帕查医疗保健机构是非洲卫生历史上最重要的组织之一。它的起源可以追溯到19世纪。该机构位于阿尔及利亚首都市中心的地理位置和建筑布局，都反映了其悠久的历史和重要的地位。但在2015年，一些政见提出有必要拆除整座医院。但由于结构方面的复杂性和经济问题，这一提议只成为了一个乌托邦。本研究的目的是揭示该院作为一家受保护机构和功能性机构，在这两方面所具有的不同文化遗产规模价值。这些价值是医院所在城市都市化、其建筑准则和医学历史的一部分。多标量的价值包括城市价值、建筑价值、集体价值、科学价值，以及归属感。研究结果的首要目的，是指出穆斯塔法•帕查医院作为一项建筑遗产，因其在建筑、人力、医疗、外科和技术发展方面所作出的贡献而具有的重要意义。 其次，研究结果揭示了医疗卫生机构定位为建筑遗产而进行保护的可能性。研究还具有一些直接的实际影响。例如，为今后旨在了解20世纪的卫生医疗组织机构及价值一般情况、以及以穆斯塔法•帕查医院为具体建筑对象的研究提供了学术基础。此外，通过研究中对信息的重新整理，还提供了深入的数据，便于促进对该院的了解、并有利于遗产文件申请工作的开展。

关键词:
卫生机构；都市化；价值；可持续发展

1 INTRODUCTION

Mustapha Pacha healthcare facility is one of the first built healthcare structure in Africa (Saouillet, 1955). It constitutes a rich sanitary history from the Ottoman period to the actual contemporary world, but till today, it has rarely been studied through architectural researches. Its architectural data is divided between the archives of Algeria and France and its building structure is fragmented between oral and written history. Its first available plan is dated on 1854 but testimonies of its creation dates of 1851 (Bodichon, 1851). It exposes the organization of the wards to receive the French injured military corps during the different wars (Saouillet, 1955). Its strategic implementation near the coast and in the Algiers' heart city center made it one of the most important sanitary structure till nowadays. But due to hospitals' life cycle in general and regarding the continuous development of influent factors (such as medical' technologies, industrial revolution, demographic growth and human' comfort assessment and appraisals) it requires more internal spaces and different spatial organizations (« Grandeur et décadence de l'hôpital Mustapha », s. d.; liberte-algerie.com, s. d.). Since the 70th the Algerian government worked on a national strategy for both qualitative and quantitative healthcare system that involves the planning of hospitals and the rehabilitation of the structures currently in existence. But due to both the huge surface of the country and to a lack of the inclusion of architectural perspective, in 2015, the ministry of health of Algeria has exposed the aim to build a new healthcare structure projection for the Mustapha Pacha hospital instead of its rehabilitation (« Le nouveau centre hospitalier universitaire d'Alger », s. d.; « University Hospital Center Alger », s. d.).

No information has been presented about the Mustapha Pacha ancient structure reuse or demolition but the main objective of the project was to offer users more humanized and adaptable spaces and till today, the project never began due to economic issues and to the dependent economic budget of hospitals (Kaddar, 1988; Mezouaghi, 2015). The controversial projection offered this research the opportunity to look forward to expose the Mustapha Pacha original values and potential as an ancient structure. Healthcare facilities are a specific architectural concern in practice and research (Ulrich, 2006). From the modern period to nowadays, architects' goal is to make them functional, humanized and concerned about future developments, regarding all their complex missions (Lankford et al., 2003). The role of the "*machine à guérir*" (Foucault et al., 1979) is to make children as comfortable as in their house and to make elder people as confident, relaxed and in contact with nature in order to keep them connected to the world and to feel part of it development and continuity (Inouye et al., 2000). Through multidisciplinary studies, it has been proved that the impact of a built healthcare structure on users is important (Rajendran, Gambatese, & Behm, 2009). Environmental components and evidence based design have to improve users' outcomes. The evaluation of space is fundamental to understand both users' need and how architects can improve it. Even the green building need to be evaluated in order to create continuous healing design. It is important to evaluate healthcare facilities from different periods and to evaluate users' satisfaction to see how much architecture contribute to the well-being of hospitalized persons, even if it is an ancient structure (Paul & Taylor, 2008).

It is commonly known that heritage is the common material or immaterial wealth of a group. In architecture, it regroups monuments, natural and urban sites. Palaces, theatre or houses are part of heritage but it is not really common to find healthcare facilities. The Art Deco San Pau hospital of Barcelona (Marsili, 2014) and the Otto Wagner Hospital of Vienna (« Heritage Alert: Otto-Wagner-Hospital, Steinhof, Vienna - International Council on Monuments and Sites », s. d.) are part of the UNESCO heritage list (Centre, s. d.) but both are facing difficult phases due to management issues. The Children's University Hospital of Niño Jesús 1879 which is part of the national monument list (de Rojas et al., 2004). Being part of the international or the national heritage list offer the possibility to valorize and optimize the interest regarding healthcare structures. Among the main elements of selection to protect a monument, the UNESCO exposes clear and organized criteria. Among those criteria, values play a major role. Francoise Choay (1992) expresses values through different scales. They can differ from a structure to another. She also expose the negative impact of "*patrimonialisation*"

that can damage the architecture through excessive exploitation as tourism (Choay, 1992). Protecting a structure can also limit its use under the heritage law (Zeroual, 1998) and that is why this study do not aim to make the Mustapha Pacha as an architectural inventory but to highlight its values in order to expose its importance and impact both the architectural and healthcare field.

2 METHODOLOGY

The overall method consists to analyze the historical, urban and architectural data collection of the hospital to understand its historical stratigraphy, its actual spatial organization and use under values which can be a basic research to promote the importance of the building (Choay, 1992) and its contribution to sanitary heritage at a local or an international scale.

The observation was also an important tool to understand some architectural facts. The values are exposed through argumentative findings under 5 main values: the urban value, the architectural value, the collective value, the cognitive value, the value of the place names and the belonging value. Those values are part of the contribution to the comprehension of the building and its protection under a sensorial rehabilitation and sustainability. For a long term impact, those values are contributors of the sustainability, the "*patrimonialisation*" (Di Méo, 2007) and the sensory rehabilitation of ancient healthcare facilities.

3 RESULTS

The data collection findings reveal a rich architectural stratification of the hospital. The available data exposes the development of the construction of Mustapha Pacha through more than 168 years. The first plan is from 1854 and shows how the hospital was partly a civic and a military structure at the same time (« Alger, ville & architecture 1830-1940 », s. d.). The regrouped historical data expose how architects, urbanists and scientists has contributed to the Mustapha Pacha healthcare development in Algeria.

The urban interaction between the hospital and the city of Algiers is fundamental and constitute one of the "*urbanity"* of Algiers (Picard, 1997). In fact, the surface of 14 hectares of the hospital is in the heart of the capital and forms an urban park for the neighborhood and a urban shortcut for daily urban use (Fig. 1) The double (internal and external) urbanity and the centrality of the structure offers the possibility to live the space freely but in a controlled way.

The findings expose 5 main important values for the hospital structured from the urban scale to the architectural scale and from the immaterial value to the material value. Each value exposes the impact of the construction to develop healthcare and healthcare design.

3.1 THE URBAN VALUE

Mustapha Pacha implantation is located in the heart of the first extension of the urbanism of Algiers. It is part of the main central districts of the city and is integrated to the daily urban life. As far as the hospital exists its urbanity is part of the urbanity city of Algiers. The complex is in the heart of three main districts of Algiers: The Champs de Manoeuvre of Algiers, The Hassiba Benbouali main district and the Messonier district. The different accessibility points offer the fluidity of the city through the hospital. In fact, connections are direct through the hospital' internal road structures and offers the inhabitant of Algiers to use the internal roads of the hospital as shortcuts to have direct access to the lower or the higher point of the city. The connectivity of the hospital to the city urban word offers the possibility to create direct relations and to promote the central garden of the hospital as an opportunity for the neighborhood' citizens to interact inside the hospital and for the users of the hospital to interact with external people. Offering social possibility exchange inside a healthcare facility is a positive strategy for positive outcomes (Douglas & Douglas, 2004).

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Fig. 1 The internal and the external urbanity of the Mustapha Pacha hospital

3.2 THE ARCHITECTURAL VALUE

The history of the hospital construction is a testimony of the stratification of important architect of the two different centuries as GuiAuchain Jules Voinot or Xavier Salvador (Aiche, 2003) through different periods (Fig. 2). Besides the different period of the hospital building we can observe an open book exposing architecture from the 19th till the 21th century (Fig. 2).

Fig. 2 The evolution of the Mustapha Pacha hospital through centuries

Architecture values can be evaluated at different levels from macro to micro. From the plan organization to the unit interaction with the external spaces. From a macro observation, each building has a specific composition of wards. The external spaces of transition composed of roads and greenery spaces form indirectly spaces of meetings and relaxation. The ward' composition and its complexity offers the services an adaptable space to receive inpatients even if the increasing number of population makes space use satisfaction sometimes impossible. Beside the matter of management, the structures are aging rapidly than expected. The architecture of wards is planned to answer user's needs of the 21th century but with a less number and more strategic management. The architectural details and technical elements composing the space are one of the most performing during the 1950 (Chantiers, 1950).

The Medical Infantile Unit build in 1883 than in 1948 (considered as the first children hospitals in Africa) is a major testimonial of space organization and internal interaction through its central elevator for daily management and function use. The spaces are all connected vertically and horizontally by physical connections: the elevator is the main important first vertical connection as stairs and a central hoist load which insure and coordinate the eaten service in the hospital. The Children chirurgical service during the 1950 has one of the most developed technologies to insure child security and well-being inside the service. It also offers pathways' distinction of users in a hospital which is an important layout management preoccupation in healthcare facilities (Hanne, Melo, & Nickel, 2009).

Fig. 3 The medical infantile unit in 1955 and in 2018

3.3 THE COLLECTIVE VALUE

The Algerian communities cannot divide the city of Algiers from the hospital Mustapha Pacha regarding its national scale impact, its influence and its importance. It is part of the society references of the medical field in Algeria. Medical students come from all the cities in order to try to be formed in this prestigious university hospital center (Boufenara & Labii, 2009). Besides, inpatients come from all over the country to look for a bed inside the hospital as a reference in medical treatment and fellowship.

3.4 THE SCIENTIFIC VALUE

The hospital has formed since 1854 the first Algerian modern doctors, surgeons and scientists of different fields such as pharmaceutical or biological researchers. It is considered to be one of the most renowned hospitals for medical, surgical and paramedical training in Algeria centuries after. The hospital has also a national users' impact. The Mustapha Pasha hospital is the only medical school during the French colonial period that opened in 1854. The greatest researchers of the 20th century have been formed inside its walls and inside the main amphitheater.

The botanist Jules Aimé Battandier who documents the Algerian flora by his research publications. Jean Baptiste Paulin Trolard major figure in the history of anatomy and medicine has been formed in the heart of the hospital Mustapha in 1856 and later he found the first institute of pharmaceutical research Pasteur. Jean Marie Trolard, offer to the science after his graduation from the hospital contribute by his research on anatomy: "*la veine cérébrale anastomotique supérieure ou veine de Trolard*" (Stam, 2005), "*le ligament costo-lamellaire de Trolard*" , The « *loi de Trolard* » (Bussière, 1895) and « *les chevrons de Trolard* ». He contributed also by his botanical knowledge by publishing on Algeria' forest.

Even during the Algerian resistance (from 1954-1962) the hospital formed doctors who believed in the independence of Algeria and contributed for its freedom such as Pierre CHAULET (Pablos-Méndez et al., 1998).

3.5 THE VALUE OF BELONGING (LA VALEUR D'APPARTENANCE)

The Name of the hospital is part of the history of the urban site and of the history of Algeria. Mustapha Pacha was an ottoman leader who marked the history of the country. The location of the hospital is one of the Mustapha Pacha' gardens. Located in a green area it was not the best place to implant a hospital after the donation of these 14 hectares of lands.

The greenery aspect of the hospital is an evidence but offering the lower part of the garden is a strategic choice rather than a sanitary one: The purpose was to be the closest to the sea to transport soldiers quickly. The hygienic aspect of the hospital was not an evidence till the development of the construction materials and the hygienic medical movement (Bodichon, 1851). The variety and the green space is an opportunity to explore and connect the indoor spaces with the outdoor protected spaces of the hospital.

4 DISCUSSION

The results have a direct impact in practice. The values of the hospitals offer an urban and an architectural lecture of space at macro scales only but with deeper exploration more values will be exposed. Exploring the different tangible and intangible values characterizing the hospital and its singularity in order to expose its strategic role in the city and for architecture is an innovative approach to express how valuable the modern hospital architecture principles are in Algeria.

It is also an opportunity to point out a field that is not explored in Algeria by architects. Healthcare structures is a hard design that need multiple reflections and projections. The Rehabilitation Center "Groot Klimmendaal" in the Netherlands for example, took more than 9 years of projections before its construction but offers multiple evidence based design concepts and a humanized architecture. The method of this study is composed of two

major steps: historical data collection about the building to understand its composition and evolution and to understand its history never studied before. Those values offer some design' tracks of the Mustapha Pacha:

- the urbanity of the hospital is a matter of social interaction;
- the layout and planning organization is a hygienic and a safety matter;
- the greenery implantation offers psychological healing and a regeneration opportunity for the users of the hospital;
- almost two centuries of healthcare material and immaterial values needs to be valorized and promoted to maintain motivational medical development and to think about architectural reuse of space and rehabilitation in a sustainable way;
- healthcare architecture is a complex field that needs to assure multidisciplinary functions in the same bubble: housing, working, discovering, teaching, treating, operating, training, forming, discussing, maintaining, interacting and healing. A small city with multi-criteria of functional and emotional human' state;
- architects have to think about ancient structure reuse in order to insure a sufficient development and environmental protection.

5 CONCLUSION

The objective of this paper is the promotion of the healthcare structure as a discipline of specialized architecture in Algeria. It aims also to point out the necessity to think about the rehabilitation of the ancient structures following sensorial and evidence based design strategies. The planet cannot handle more consumption of natural spaces and energies. Architects need to think about the reuse of ancient structures of the 19th century and to regenerate the space through humanized design. The study offers practical use for NGOs defending the heritage field in Algeria a basic of academic knowledge regarding Mustapha Pacha values. This study can promote a submission folder for a "*patrimonialisation*" or building protection demands. It also offers the academic field original historical document and architectural data. The values exposed are not the definitive values for the Mustapha Pacha or another healthcare facility. The context of the building, its history and its use are the main elements which can offer perspective of defining ancient building values. Those are only the results of an investigation of 4 years of data collection and maybe more data could be found in France (Regarding the archive problematic of Algeria divided between the countries).

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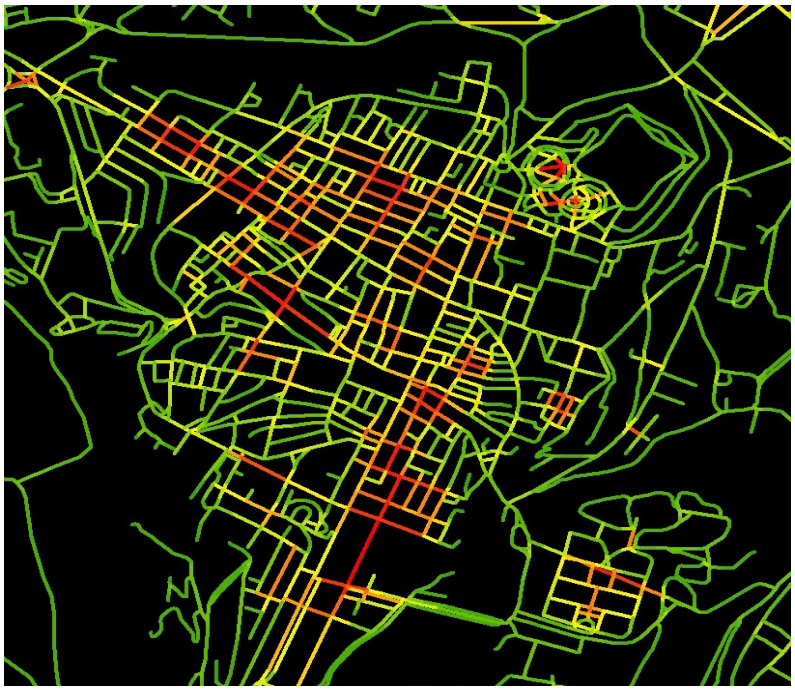

WALKABILITY AND URBAN DESIGN IN A POST-EARTHQUAKE CITY

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ABSTRACT

The research described in this article concerns the issue of accessibility with a focus on the walkability in a city that is under reconstruction, such as the city of L'Aquila struck by a destructive earthquake in 2009. The reconstruction is determining a new urban layout in which there is a chaotic overlap of flows of the movements of vehicles and people, quite exceptional with respect to the configuration of an ordinary city. For example, the flows of heavy vehicles and work machines, linked to building reconstruction, and which also generate strong noise pollution and therefore a new soundscape, increase considerably. It is a city in which the return to the residences mixes with large building sites, in which urban transformations are very fast and must be governed through appropriate urban design instruments.
The main aim of this research is to define a strategy to realize a method able to calculate at the same time an overlapping indexes in order to classify streets according to how friendly they are for the pedestrian and bike. This theme is approached to a methodological level and is related to the interacting theme of urban design and new centralities. The tool used for this integration is the Strategic Urban Project, which the research experience has found to be more effective and with greater performance than the more traditional Land Use Planning. The design approach and methodology is to integrate urban design techniques with spatial planning techniques, in order to obtain a higher performance of pedestrian networks.

KEYWORDS:
Walkability; Urban Design; Spatial Planning; Transport

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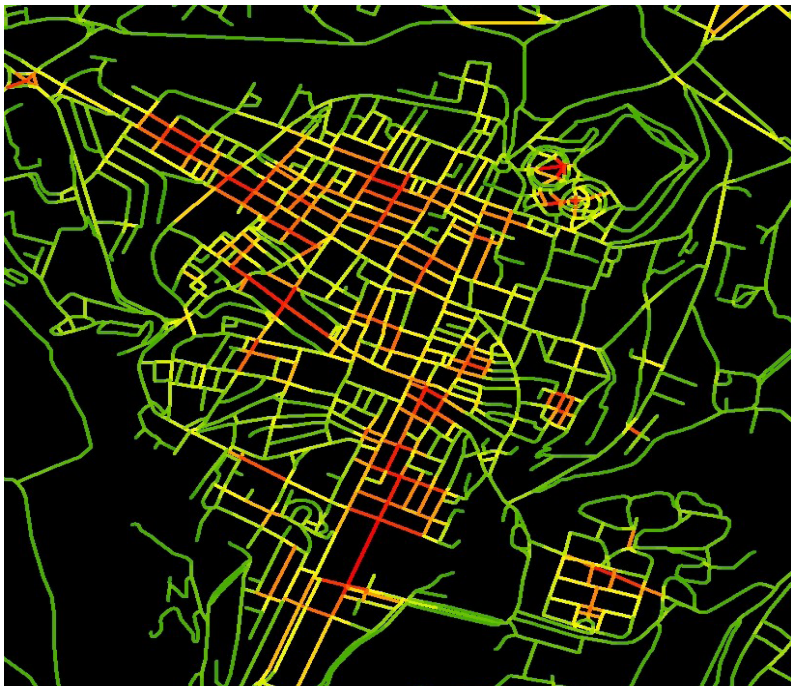

地震灾后城市的步行适宜性和市区设计

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摘要

本文所述的研究主要是关于通达性的问题，其重点在于城市在重建过程中的步行适合程度，例如2009年遭受地震严重破坏的拉奎拉市。重建工作决定了城市的新布局——其中存在人流与车流重叠存在的混乱状况，这与正常城市的情形截然不同。例如，由于房屋重建的需要，重型车辆和工程机械的车流会大幅度增加，并且也会产生巨大的噪音污染和不同以往的声音环境。在居住区域重建与大型建筑工地相互混杂的城市中，其城市化带来的转变非常迅速，必须通过适当的城市设计措施进行管控。
本研究的主要目的是制定一种策略，以确立某种方式来计算某个期间内的重叠索引，根据街道对于行人和自行车的便捷程度对其分类。我们从方法学的角度来处理这一主题，并将其与城市设计和重建后集中度的相互作用关联起来。这项整合工作所使用的工具为战略性城市项目法。研究经验证明，该方法比传统的土地使用规划法具有更高的效率和成效。采用的设计方式和方法，是将城市设计技术与空间规划技术相结合，以实现效果更佳的步行网络。

关键词:
步行适宜度；城市设计；空间规划；交通

1 INTRODUCTION

This article describes the basics of a research in its preliminary stages, It concerns the project and the performance of the walkable and cycling-walkable networks of a city characterized by an exacerbated polycentrism (Espon, 2005), like the city of L'Aquila which is going through a strong urban, social and economic transformation due to the 2009 post-earthquake reconstruction process which is still in progress. This accelerated process is taking place without a real government of transformations, without the idea of the city in the future, without a vision, all also without an assessment of the sustainability and performance of the reconstruction. The research is grafted onto this situation, in which L'Aquila is a paradigmatic case, But this condition also concerns other Italian cities where the level of physical and social fragmentation is very high.
In this specific field the scientific literature focuses more on the themes of physical and economic reconstruction than social reconstruction and the issues of accessibility (Bono & Gutiérrez, 2011), sustainable mobility and in particular on walkability. Our study, which draws its origins from a more extensive research on the transformations of infrastructure and mobility in cities hit by natural and anthropic disasters (D'Ascanio, Di Ludovico & Di Lodovico, 2016; D'Ovidio, Di Ludovico & La Rocca, 2016; Di Ludovico & D'Ovidio, 2017), focuses on this last topic, walkability, tracing a model of city development that considers urban fragments as new urban centralities, innervated by a railway axis that operates as a subway serving these new centrality. In every centrality corresponds in the general vision of development. A Strategic Urban Project (Albrechts, 2006) is a large scale urban project (Di Ludovico & Properzi, 2012; Di Ludovico, 2017;) which is characterized by a high level of urban innovation, also in application of the principles of Smart city (Di Ludovico, Properzi & Graziosi, 2014; Di Ludovico & Properzi, 2018). It's a Plan design according with a concept of mobility model that favors sustainable public transport and discourages private (today predominant) and which prefers, within these new centralities, walkable and cycling-walkable movement. Section 2 describes the initial conditions of the post-earthquake city, an extremely fragmented city and its fragments develop along a linear infrastructural bundle about 14 km long. Section 3 briefly describes the general idea of sustainable development of the city in terms of spatial planning. Finally, the third section deals with the methodology for designing and assessment the performance of the walkable and cycling/walkable network. The conclusions essentially trace the future developments of the research.

2 L'AQUILA FRAGMENTED CITY

The 2009 earthquake has hit an economic system largely in crisis. Overall, the economy of the L'Aquila area before the earthquake was already declining substantially, with a fall in per capita and industrial value, a decrease in employee productivity and a weak performance of services before the earthquake (Cresa, 2011). After the 2009 earthquake, this crisis was accompanied by a first population decline followed by a fluctuation and in recent years by a stabilization of about 69,000 inhabitants. Because of this we must add a decrease in the number of university students, around 25,000 just after the earthquake, and today around 19,000, are based in L'Aquila. Around 12,000 of them are from off-site. The result of the first step in the emergency phase of recovery from the disaster is a large area which include the city where 19 new settlements have been built. They are the CASE projects (CASE is acronym for Sustainable and Environmentally Friendly Anti-seismic Complexes), erroneously called New Town, of 4,500 dwellings and 15,000 inhabitants. CASE was realized without a spatial planning strategy, without taking into account urban planning and territorial rebalancing, resulting in a substantial increase in settlement dispersion and unplanned land consumption (+ 6.7%). This situation is worsen by a sprawl in the agricultural pattern where more than 1,500 prefab houses in wood were built. The post-earthquake dispersion has also affected the commercial system, which has moved to the periphery of the city and has a changed shape. In fact, the small commercial network had characterized the city before the earthquake, after it was concentrated in some abandoned factories in the industrial areas, on the periphery of the city, thus composing a sprawl pattern of small "shopping malls" that did not exist before

the earthquake. All this has exacerbated the polycentrism of the city, results in a very high number of secondary poles composed of hamlets, of which one with 5,000 inhabitants, of 19 CASE projects, of industrial agglomerations that today are mainly commercial and directional (Fig. 1). This phenomenon is now accompanied by a strong propensity for urban innovation, with the tendency to apply the principles of smart city and smart growth to reconstruction (Duany, Speck & Lydon, 2010) and a model of sustainable mobility and urban transformation oriented to the needs deriving from contemporary social models (Touraine, 2010).

Fig. 1 L'Aquila, Urban centralities before and after the 2009 earthquake

3 RECONNECT THE URBAN FRAGMENTS

The redevelopment of a particular urban system, such as that of L'Aquila struck by the earthquake, has as its main strategy the "reconnection" of urban fragments derived from post-earthquake disintegration. The goal is to connect the fragments together through the development of sustainable urban networks, maintaining the polycentric post-earthquake urban structure, thus avoiding the environmental costs that would be necessary to recompose a city that already had clear signs of dispersion before the earthquake as well as obvious problems on the topic of urban mobility. The "reconnection" urban project is based on the following elements: the presence of urban fragments, that is urban parts without a coherent structure, isolated, which no longer have an efficient system of services and facilities and which are not effectively connected to the infrastructural network; the presence of an inefficient mobility system, with high transport costs, and an almost unused valley railway; the possibility of structuring efficient and integrated urban networks, both of an environmental nature and of an infrastructural material nature (mobility) and intangible nature (digital).

3.1 THE PROPOSED URBAN DEVELOPMENT MODEL

As can be seen in Fig. 2, the idea is to connect the fragments (urban parts, including the historic center) through the railroad that must be transformed into a metro with high-frequency trains. From the stations of this metro, feeder lines are connected that distribute the residents to the fragments that are generally residential settlements of about 1,000-2,000 inhabitants. Thus, many urban parts that are now isolated and incomplete with services and facilities are connected to the metro. The goal is to structure a Strategic Urban Project (Albrechts, 2006) for each of them that transforms these parts into self-sufficient urban nuclei pursuing the principles of sustainable development and smart growth. Looking for an analogy in the scientific literature, this development model can be related to Transit Oriented Development (TOD), developed in the 1990s in relation to sustainable mobility policy (Barton, 1998; Calthorpe, 1993), which is applied to parts of the city, centered on "transit stops" (such as metro stations), which are re-planned as mixed-use places, with specific urban densities and a high quality and easily accessible cycling-walkable network (Vale, 2015). However, the goal is not only the physical and spatial re-planning of the part but also the construction of a new system of social relations that makes the same urban part more livable, in which the local community also plays a major role (Dittmar & Poticha, 2004). In our model all these factors are fundamental, but there are some innovations.

First of all, the development area is not a district of the city but are settlement systems belonging to a polycentric structure, thus, they are fragments. Moreover, the transit stop, that is the connective node, is not only the station but also the distribution feeder line. Finally, sustainability is not achieved only by facilitating Walkability or Cyclability as much as possible but also by facilitating the use of zero-emission public transport.
In the Strategic Urban Projects, which re-design the fragments to develop new small polycentric urban centralities, we pursue the following objectives: complete or implement the system of basic public services and facilities to make the centrality self-sufficient; improve accessibility and bring it back to a limit distance of 300 m, also applying innovative principles of urban densification (Jenks, Burton & Williams, 2005); improve the urban safety of centrality, both in physical terms and in social terms; innovate urban systems through the application of new Smart technologies also aimed at contrasting and mitigating the effects of climate change; supporting network development, that is centering the development on the network paradigm, integrating urban environmental networks (green infrastructure (EC, 2013)), sustainable infrastructural networks (also digital), networks of urban (and social) spaces.
These objectives must also be pursued through the construction of a system for assessing the social, economic and environmental performance of Strategic Urban Projects, an assessment that is considered essential to achieve an optimal design solution but above all to verify the performance of the projects ex-post. The next section describes, in the context of new centralities, the methodology for the evaluation of existing road infrastructure systems to be the site of safe cycling and walkable networks.

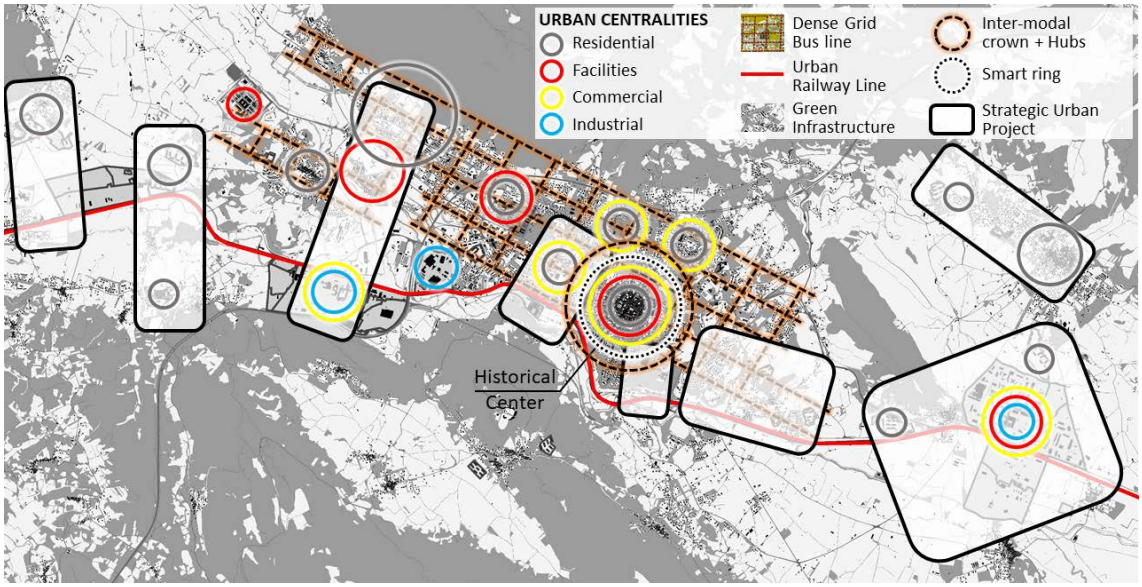

Fig. 2 L'Aquila, the Strategic Urban Projects

4 SECURE AND SAFE WALKABLE NETWORKS: THE ASSESSMENT METHODOLOGY

In our research, the road network (De Vico, Di Ludovico & Colagrande, 2014) is integrated with the other networks that refer to the concept of smart growth and resilience (Fekete & Fiedrich, 2018) such as green infrastructure (EC, 2013) and the system of public spaces together with the theme of urban security (Brand & Nicholson, 2016). These three networks (Transport, Green and Public Spaces) are integrated by a fourth the digital network, which is now rapidly developing in L'Aquila as application of the principles of the Smart city.
A particular class of network, inside the mobility system, is the walkable or cycling-walkable network. In relation to urban physical characteristics and national legislation, for safety this network should have the minimum of intersections with roads and meet the following criteria oriented to accessibility and safety:
sufficient road width to create a bicycle lane with a minimum width of 1.50 m in one direction or 2.50 m in two directions. This criterion concerns only Cyclability; sidewalk width sufficient to create a walkable lane with

a minimum width of 1.00 m in one direction or 2.00 m in two directions. This criterion concerns the Walkability. Also integrating Cyclability. These widths are increased by the quantities in the previous point; maximum index of alignment of the facades of buildings facing the road (absence of indentations); longitudinal slope less than 5%; horizontal curvature radii greater than 3.00 m; distance from the primary public services (collective services, public spaces, etc.), public facilities, from the feeder line and from the metro station less than 300m. Our research is based on the development of a GIS application able to automatically evaluate the aforementioned criteria, divided by Walkability (W), Ciclability (C) and Walkability + Ciclability (W + C), based on an urban analysis founded on geographical coverages that describes the settlement with vector primitives derived from the Regional Map on a scale of 1: 5.000. The expected result are maps in which the road axes are associated with summary indicators of suitability and performance, such as: I_W, I_C and $I_{W\&C}$. These indicators will make it possible to define the design lines for the Walkability of parts of the city, and to determine which parts of the infrastructural network can be dedicated exclusively to walkable traffic, eliminating private vehicular traffic. The aims are focused to define the abovementioned mathematical indexes to be used for evaluating new urban designs and strategies on turning cities into more walkable friendly places, considering also soft modes of transportation that are regarded as beneficial both in environmental and social in terms. This methodology seems to be promising but there are still several issues to be solved in order to achieve overarching and superimposable I_W, I_C e $I_{W\&C}$ indexes. The calibration process need to be elaborated by taking into account the overlapping of the three indexes at sametime.

5 CONCLUSION

The work presented in this research concerns a more focused and deeper aspect of a wider research on the transformations of cities hit by disasters of natural and anthropic origin. The general theme is the physical and social "reconnection" of fragmented cities due to a strong shock through Urban Design tools, within which the work group is developing the specific theme of Walkability, whose research is presented in this paper in the form of methodological assumptions. The scientific studies on the reconstruction of L'Aquila are demonstrating the need to intervene on the city with effective and rapid Strategic Urban Projects of large urban parts in the context of a long-term Vision. The Projects are presented in these studies as actions to build new communities and new urban centralities in this, to apply the principles of Smart City and Smart Growth as well as Sustainable Development. In this sense a sub-theme selected was that of mobility within which we are developing Walkability also in terms of performance. The expected result is that of progressively reducing private vehicular mobility in favor of zero-emission public mobility and in favor of pedestrianization, within large urban parts in a certain sense disintegrated and today undergoing strong uncontrolled transformation, without government. The design and assessment model of the proposed Walkability, in the future can be further characterized to support performance even in critical conditions (not in safety), such as those that occur after an earthquake or another catastrophe. In this case the criteria (4) must be further investigated and can also be linked to real-time assessment supported by measurements made with a sensor network or with drones.

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REVIEWS PAGES

THE TIMES THEY ARE A-CHANGIN' 2(2019)

Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. During the last two years a particular attention has been paid on the Smart Cities theme and on the different meanings that come with it. The last section of the journal is formed by the Review Pages. They have different aims: to inform on the problems, trends and evolutionary processes; to investigate on the paths by highlighting the advanced relationships among apparently distant disciplinary fields; to explore the interaction's areas, experiences and potential applications; to underline interactions, disciplinary developments but also, if present, defeats and setbacks.
Inside the journal the Review Pages have the task of stimulating as much as possible the circulation of ideas and the discovery of new points of view. For this reason, the section is founded on a series of basic's references, required for the identification of new and more advanced interactions. These references are the research, the planning acts, the actions and the applications, analysed and investigated both for their ability to give a systematic response to questions concerning the urban and territorial planning, and for their attention to aspects such as the environmental sustainability and the innovation in the practices. For this purpose, the Review Pages are formed by five sections (Web Resources; Books; Laws; Urban Practices; News and Events), each of which examines a specific aspect of the broader information storage of interest for TeMA.

01_WEB RESOURCES
The web report offers the readers web pages which are directly connected with the issue theme.

author: Rosa Morosini
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02_BOOKS
The books review suggests brand new publications related with the theme of the journal number.

author: Carmen Guida
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03_LAWS
The law section proposes a critical synthesis of the normative aspect of the issue theme.

author: Federica Gaglione
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04_UBAN PRACTICES
Urban practices describes the most innovative application in practice of the journal theme.

author: Gennaro Angiello
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05_NEWS AND EVENTS
News and events section keeps the readers up-to-date on congresses, events and exhibition related to the journal theme.

author: Andrea Tulisi
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评述页：

提高城市系统对自然及人为变化顺应能力的方法、工具和最佳实践

TeMA 从城市规划和流动性管理之间的关系入手，将涉及的论题逐步展，并始终保持科学严谨的态度进行深入分析。在过去两年中，智能城市（Smart Cities）课题和随之而来的不同含义一直受到特别关注。
学报的最后部分是评述页（Review Pages）。这些评述页具有不同的目的：表明问题、趋势和演进过程；通过突出貌似不相关的学科领域之间的深度关系对途径进行调查；探索交互作用的领域、经验和潜在应用；强调交互作用、学科发展、同时还包括失败和挫折（如果存在的话）。
评述页在学报中的任务是，尽可能地促进观点的不断传播并激发新视角。因此，该部分主要是一些基本参考文献，这些是鉴别新的和更加深入的交互作用所必需的。这些参考文献包括研究、规划法规、行动和应用，它们均已经过分析和探讨，能够对与城市和国土规划有关的问题作出有系统的响应，同时还对诸如环境可持续性和在实践中创新等方面有所注重。因，评述页由五个部分组成（网络资源、书籍、法律、城市实务、新闻和事件），每个部分负责核查 TeMA 所关心的海量信息存储的一个具体方面。

01_WEB RESOURCES
网站报告为读者提供与主题直接相关的网页。

author: Rosa Morosini
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02_BOOKS
书评推荐与期刊该期主题相关的最新出版著作。

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03_LAWS
法律部分提供主题相关标准方面的大量综述。

author: Federica Gaglione
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04_URBAN PRACTICES
城市的实践描述了期刊主题在实践中最具创新性的应用。

author: Gennaro Angiello
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05_NEWS AND EVENTS
新闻与活动部分让读者了解与期刊主题相关的会议、活动及展览。

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01

THE TIMES THEY ARE A – CHANGIN' 2(2019)

REVIEW PAGES: WEB RESOURCES

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In this number

THE ROLE OF SOIL IN ECOSYSTEM SERVICES

Local decision makers have invested substantial economic and human resources to adapt cities to climate change by increasing their urban resilience. In this perspective, the eco-system services have been integrating more and more within both spatial planning and urban governace (McPhearson et al., 2015). In fact, ecosystem services are essential for human well-being and, at the same time, they support economies at different scales, from local to regional and national. In general, traditional economic evaluations do not consider the indispensability and the unrepeatability of these resources, contradicting the concept of sustainable development introduced for the first time in the Brundtland Report in 1987.

For this reason, it is clear why the integration of functions and ecosystem services has become essential in urban and territorial transformation decision processes. Local administrators can monitor the threatening pressures on ecosystem and their functionalities, improving their effectiveness and "building" a governance model based on tools that consider the right management of environments and of ecosystem services.

With that in mind, the evaluation and the mapping of Ecosystem Services can be a significant support in decision-making processes related to the land-use matter, in order to get services even more sustainable (Pelorosso et al., 2016).

Soil represents a fundamental contribution to ecosystem services, due to its multiple functions such as: the production of biomass and food; the supply of raw materials; site of human activity and, above all, for its waterproofing and carbon storage functions, which are essential to mitigate the climate change effects (Zucaro & Morosini, 2018). The soil contributes to ecosystem services through its functions in terms of "benefits that people can gain from ecosystems" (Calzonari et al., 2015), and it is one of the four classes defined by the Millennium Ecosystem Assessment in 2005 (MEA, 2005), which are used to classify ecosystem services.

In fact, this classification provides for the articulation in ecosystem services in four functional classes: for providing, in terms of products obtained by ecosystems such as food, pure water, fibre, fuel, medicines; for regulation, since ecosystem services' benefits have impacts on climate, water regime, pathogens' actions; for cultural aim, because ecosystem services can produce non material benefits in a spiritual, ethic, recreational, aesthetic and social sense; for support, considering all the supportive services to ecosystems such as soil formation, nutrient cycling and primary production of biomass (MEA, 2015).

LSECities
https://lsecities.net/

LSE Cities is an international centre at the London School of Economics and Political Science that carries out research, graduate and executive education and outreach activities in London and abroad. The centre studies how people and cities interact in a rapidly urbanising world, focusing on how the physical form and design of cities impacts on society, culture and the environment.

In the website homepage, at the top right there are the eight sections (about; research; publications; events, urban age; education; urban at LSE and join us) into which the site is articulated, as well as the links to social pages such as Twitter, Facebook, Linkedin, and YouTube. An interesting section is the one dedicated to the research; in this section it is possible to access to multiple contents that are organized in three subsections, in relation to the particular theme of interest:

- cities, space, and society;
- cities, environment, and climate change;
- urban governance.

Sliding down, the page allows to visualize contemporarly all the pages of the three subsections through an image, a title and a caption describing the contents. The browsing is quite simple, considering that with a click on the image it is possible to connect to the page on interest. For what concerns the natural resources and ecosystem services theme, in the "cities, environment and climate change" subsection there is a whole page dedicated to the "resource urbanisms" project, co-funded by LSE Kuwait Programme (,) and it aims at examining multiple aspects of how natural resources, urban form and infrastructure affect each other and potentially lead to the establishment of divergent forms of urbanism.

The starting point of the project is the common idea that cities and urban development are directly interested by availability and costs of natural resources, and that, on their behalf, different forms of urban development can lead to substantial differences for the use of resources. The project, in particular, is related to the use of two specific resources, soil and energy, and it explores their relationships with the urban shape, mobility and built environment.

Through the project page of the site, it is possible to find out general information related to the project and, on the left, all the events, news and publications, while on the right (in the same page) there are all the information related to the project partners, as well as to the stakeholders, project experts, project coordinator, researchers, project partner, project collaboration, project funders; finally, there are the project schedule and its keywords.

Moreover, the Publications section is rich of contents and easy to consult, since there are further four subsections: books; journal articles & papers; reports and urban age and other writing. With a click, users can get access to a wide range of useful links to deepen knowledge on a theme. If interested in events, users can consult the events' section, where future and past research conferences are reported, as well as an archive of events taken in the last ten years.

Urban at LSE is a portal for masters and doctoral teaching and for research activities on cities and urban issues across LSE and its aim is to be a rich resource for teachers, researchers and university students. Moreover, LSE Cities invest in multidisciplinary research through seed funding and hosting visitors and academics. At the end of the page, as well as at the end of each page, there are many links to get a quick access to the website sections, and on the top right there is a box for a keyword search.

100 RESILIENT CITIES
http://www.100resilientcities.org

100 resilient cities was created by the Rockefeller Fundation for its 100th anniversary, in 2013. In that year, only 32 cities all over the world were collaborating with the group until november 2015, when they got 100. The team members of the 100 resilient cities are expert judges who examined over 1.000 requests of potential cities to take part in the project. From the homepage it is possible to access to the seven sections of the site, as well as to the keywords research box.
The most interesting sections are: resources and urban resilience. The first section includes tools that can help to increase and improve resilience levels of urban systems; publications and media documents refered to that theme. The urban resilience section has contents related to the definition of resilience and all the characteristics that systems need to have in order to be defined as resilient. The information related to events, past and incoming, deidicated to this issue are in the news section. In the partners section, there are all the member cities, there is also the resilience strategy, promoted as one of the mai tools promoting 100 resilient cities. The stretegy is the product of a process that lasts from six to nine months and it joins people, projects and priorities, promoting innovative solutions which are crucial for cities that are facing resilience challenges. From each page, on the bottom right, it is possible to access, through quick links, to different sections and to social network pages such as Facebook, Twitter, Linkedin and YouTube.

BISE
https://biodiversity.europa.eu

The Biodiversity Information System for Europe (BISE) is a portal where data on biodiversity can be consulted, to support the realization of the European Union strategy. BISE is a partnership between the European Commission, DG Environment - Directorate B, and the European Environment Agency, supporting the knowledge base for the implementation of the EU 2020 Biodiversity Strategy. It also serves as the Clearing House Mechanism for the EU within the context of the United Nations Convention on Biological Diversity (CBD) and as such it is supported by the collaboration of the European CHM network and the CBD Secretariat.
The web site is easily consultable, in fact the home page can be divided into five parts:

- topics;
- policy;
- data;
- knowledge;
- countries;
- networks.

All the sections are organized in subsections to whom it is possible to access through quick links; moreover, they have rich and interesting contents.

One of the most interesting links, in the topic section, is refered to the Flagship Projects, where the user can deepen its projects' knowledge, and consequentely of their results, developed in the European context. One of the project is SOER 2015 – The European environment – state and outlook in 2015.
For what concerns the role of soil in the ecosystem services, the subsection threats in the topic section is very interesting: users' can access to these contents by clicking on the land use change link. In that way, it is possible to access to a page completely dedicated to this issue, where relations between land use change and impact on biodiversity are analyzed, highlithing their importance for the territorial transformation governance, promoting interventions aimed at reducing the effects of climate change and/or fragmentation, through sustainable intervention such as green infrastructures.
At the bottom of the page, there are further links that allow users to acess to other connected web sites, referred to the same issue. The section policy and data give information and data on global and European projects policies, such as: the Strategic Plan for Biodiversity, 2011-2020; EU 2050 vision; CBD and other conventions infrMEA. As for the policy section as for the data section, there are numerous links that allow users to immediately access to connected pages. In the knowledge section, there are some useful directions to the main European funding sources for research aimed at biodiversity and ecosystem services such as: Horizon 2020, LIFE programme, European Research Counsil and, more globally, Future Earth.
Back to the homepage, on the bottom there are three links: about BISE, where information concerning the portal is given; Contact us, through which users can find contacts; and street addresses and SiteMap, where users can find an overview of available contents.

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IMAGE SOURCES

The images are from: https://biodiversity.europa.eu; http://www.100resilientcities.org; https://lsecities.net/

02

THE TIMES THEY ARE A – CHANGIN' 2(2019)

REVIEW PAGES: BOOKS AND JOURNALS

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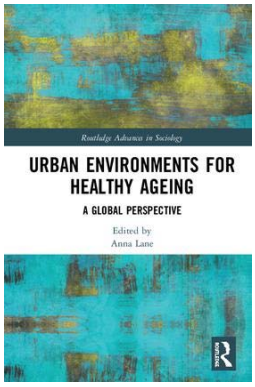
In this number

AGEING IN AGEING CITIES

"Ageing in ageing cities" is not just a wordplay: it represents one of the hardest economic and social challenges that have never been faced in human history, with significant impacts on employment, education and health (ARUP, 2015). In European Union, at beginning of 2016, the share of people aged more than 65 years old was about 19%, with an increase of 2.4% compared to 2006; according to some projections, this trend is going to increase during next years, up to 30% in 2080. Considering a strong increase of the infertility rate and a significant birth decrease, this ageing phenomenon would lead to a deep demographic change. Cities would suffer the consequences of this unexperienced phenomenon, because of their complex structure and of the high human presence in their physical and digital environments (Angelidou, 2017). It may seem a paradox, because, since the birth of cities, accessibility to activities, people and ideas for a wide and heterogeneous group of people has been one of the essential and inalienable traits of urban life. "The Times They are A-Changig" and then, the paradox is only apparent, considering the complexity of urban systems, due to last century technology innovations, the growing of well-being levels, the changing of family lifestyles (Massa & Campagna, 2014), and therefore the multiplication of space-temporal fractures, the lack of transparency and consistency. With that in mind, it is easy to understand that elderly people dwelling in urban areas will suffer for a more and more limited participation in the decision of territorial processes and for a deeper social exclusion, due to the lack of accessibility to local public transport, for the presence of barriers and obstacles accessing to public spaces, for bad health conditions due to pollution and sedentary lifestyle.

Thanks to a deeper awareness on the issue, plans, strategies, initiatives and solutions of all sorts and sizes are being developed to design new shapes and functional structures for cities (Papa et al., 2015), in order to be age friendly. This planning view requires a holistic approach to the urban environment, taking into account the land-use and the transport systems, whose interaction is critical to satisfy the community needs, guaranteeing certain level of service.

According to these themes, this section proposes three works (two books and a scientific journal) that help to better understand the topics of this number: Urban Environments for healthy ageing. A global perspective; Geographies of Transport and Ageing; Aging in Social Policy.



Title: **Urban Environments for healthy ageing. A global perspective.**
Author/Editor: Anna P. Lane
Publisher: Routledge
Publication year: 2019
ISBN code: 978-0-367-19755-1 (hbk), 978-0-429-24309-7 (ebk)

Urban Environments for healthy ageing. A global perspective. It is an interesting volume based on a selection of papers, as well as activities and discussions arisen from, presented at the inaugural International Ageing Urbanism Colloquium, 26-27 October 2017, at the University of Technology and Design of Singapore. The contributions were developed on the following themes: (a) affordable and accessible housing options to support ageing in place; (b) urban environments to promote health-enhancing mobility and activity pattern; and (c) innovative planning and design strategies for inclusive and age-friendly neighborhoods. The themes map directly onto select key priority areas in Singapore's Action Plan for Successful Ageing (Ministry of Health [MOH], 2016) and they were developed by established and emerging researchers from multiple disciplines, including gerontology, psychology, engineering, urban planning, and design, who are working in multiple contexts, including Asia-Pacific, Europe, and North America. The book is organized in three major parts: Housing (I), Mobility and Transportation (II), and Urban planning and Design (III). The first part reviews the literature and focuses on the intersections between the individuals, their housing and care services, highlighting that most people prefer living in their own homes for as long as reasonably possible. Ageing in place therefore emphasizes choice in housing decisions and, by extension, has implications for social- and health-care provision. The contributions of this first part argue integration and coordination of policies between the ministries responsible for health and construction are critical if ageing in place is to be realized. In the second part, given the association between physical and health and well-being, there are calls from public health and urban planning experts to promote physical activity through built, as well as social environmental approaches. The focus turns to transportation infrastructure and mobility, since older people rely on various modes of transport such as walking, cycling, buses, trains, and cars to move between home, work, supermarkets, healthcare facilities, recreational facilities, and so on. Transportation options influence people's perceived and actual capacity to access finance, food, care, leisure-time activities, from which they derive good health and well-being. The third part concerns more properly the urban planning process and design. This thematic part includes contributions from urban planners, architects, and designers who are working to advance innovation on urban environments and technologies for healthy and active ageing. The residential neighborhood is considered a particularly salient urban scale for older people as they tend to spend a greater proportion of their daily lives in and around their homes. This is due in part to mobility limitations that arise from declines in physical functioning and reduced driving ability. Moreover, retirement from paid work and the take-up of new roles as family caregivers or community volunteers represent other reasons why older people may spend more hours in their day at or near their home. As older adults spend relatively more time in their immediate residential area than younger adults do, they are more likely to be impacted by their experiences and exposures to social and physical aspects in that setting. Through some case studies, each contribution demonstrates how design strategies related to technology acceptance, technology adoption, and multi-stakeholder collaboration can contribute to greater transportation accessibility and ultimately greater outdoor mobility among older adults, with obvious implications for healthy and active ageing.

Title: **Geographies of Transport and Ageing**
Author/Editor: Angela Curl and Charles Musselwhite
Publisher: Palgrave Macmillan
Publication year: 2018
ISBN code: 978-3-319-76359-0, 978-3-319-76360-6 (e-book)

Geographies of Transport and Ageing presents a unique geographical perspective on issues of transport and mobility for ageing populations. Society is ageing across the globe. As well as living longer, older people are fitter, healthier and more active than previous generations were. There is both a desire and a need to be mobile in later life and mobility is clearly linked to older people's health and wellbeing. Yet mobility can be hard for older people and our neighborhoods, towns, cities and villages are not designed in an age friendly way. Moreover, when thinking about transport, travel and mobilities of an ageing population, it is impossible to do so without taking a multi-disciplinary approach. Naturally mobility involves geography, the movement of people over space and time, and it takes into account cultural, social and psychological elements. Transport is essentially a means to overcome the geography; the distance between people and place. Yet mobility is not just literal but also virtual, social and cultural. The volume brings together contributions from a broad range of human geographers with different disciplinary perspectives of transport and ageing and it outlines some of the key contemporary issues for an ageing society in terms of transport and mobility, highlighting the importance of considering transport and mobility for ageing populations. The contributions also demonstrate that a geographical approach can offer great performance to study the phenomena of transport and ageing. In fact, with case studies from across the globe, authors take a geographical lens to the important topic of transport and mobility in later life. Chapters examine how the relationships between mobility, modes of transport, place and technologies affect an aging population. This collection is of interest to scholars and students in human geography, in particular to those with interests in transport geography, mobilities, geographies of health and wellbeing, urban geographies and geographical gerontology. It will also appeal to practitioners and policy makers in urban design and planning, transport planning and engineering and public health who have interests in age-friendly cities and policy.

Journal of
Aging &
Social Policy

Title: **Aging in Social Policy**
Editor-in-chief: Edward Alan Miller, University of Massachusetts Boston
Print ISSN: 0895-9420 Online ISSN: 1545-0821

Policymakers, practitioners, and researchers need a balanced, thoughtful, and analytical resource to meet the challenge of global aging at a rate that's historically unprecedented. The *Journal of Aging & Social Policy* examines the important policy issues that affect the elderly in societies throughout the world. It is an open access journal, based in the United States of America.

The Journal of Aging & Social Policy presents insightful contributions from an international and interdisciplinary panel of policy analysts and scholars. Critical phenomena that affect aging and development and implementation of programs for elders from a global perspective are examined and analysed, highlighting not only the United States but also Europe, the Middle East, Australia, Latin America, Asia, and the Asia-Pacific rim.

Issues regularly addressed in the journal include: long-term services and supports; home- and community-based care; nursing-home care; assisted living; long-term care financing; financial security; employment and training; public and private pension coverage; housing; transportation; health care access, financing, and quality; family dynamics; and retirement.

The Journal of Aging & Social Policy closely examines the processes for adopting policies and programs at the local, state, and federal levels, examining the interplay of political and economic forces and legal and regulatory constraints on addressing the major challenges posed by the "greying" of society. The Journal is an essential source for critical and historical analysis, cutting-edge thought and discussion on age-based policy, and is potentially useful for educators, practitioners, researchers, administrators, and other readers who work with or are concerned about older adults.

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03

THE TIMES THEY ARE A – CHANGIN' 2 (2019)

REVIEW PAGES: LAWS

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In this number

"TOWARDS SUSTAINABLE MOBILITY: THE MAIN GUIDELINES"

In recent years the European Commission has promoted actions aimed at urban development in a sustainable and efficient way (Niglio & Comitale, 2015). The idea of favoring the city model is also given by the high value of negative externalities that are generated by the transport system.

The focus on identifying these externalities has grown over time, in a historical period in which the scarce presence of public resources makes it necessary to analyze the costs and direct and indirect benefits they generate in urban areas.

The scientific community identifies four main external factors associated with mobility:

- production of nitrogen oxide (NOx), sulfur oxide (SO2), ozone (O3) and other volatile organic compounds (VOC);
- noise pollution, deriving from the exposure of part of the population to the noise generated by road, rail and air traffic, especially near infrastructural nodes of considerable importance;
- accident rates, particularly road accidents;
- congestion of the infrastructural network and loss of production capacity is the time required for travel with respect to optimal time (an unloaded network).

Further externalities need to be considered, such as the exponential growth of shifts, both, and impacts on the environment and in urban areas. The European Union estimates that the transport sector has energy consumption of 35%, producing 21% of greenhouse gas emissions, with a tendency that compromises the achievement of global sustainability objectives established by international agreements (Lattarulo & Plechero, 2005)

Dir 2014/94 / EU has defined a common framework of measures for the construction of an alternative fuels infrastructure with the aim of minimizing oil dependency and mitigating the environmental impact in the transport sector (Art. 1).

The management of the minimum requirements for the construction of the infrastructure for alternative fuels, with regard to power supply systems and natural gas (LNG and CNG), in addition to the technical specifications for recharging and saving points and concerning information to users. The types of "alternative" fuels or energy sources that serve, at least in part, from sources of oil.

The directive establishes minimum requirements for the construction of infrastructure for alternative fuels, including recharging points for electric vehicles and natural gas (LNG and CNG) and hydrogen refuelling points, to be implemented through the Member States' national strategic frameworks, as well as common technical specifications for such recharging and refuelling points, and information requirements for users. Article 2 defines the types of "alternative" fuels or energy sources that serve, at least in part, as substitutes for fossil oil sources in the supply for transport and which can contribute to its decarbonisation and to improve the environmental performance of the transport. Each Member State, as regulated in Article 3, adopts a national strategic framework for the development of the market with regard to alternative fuels in the transport sector and the construction of the related infrastructure. Member States must ensure that national strategic frameworks consider the needs of the different modes of transport existing on their territory, including those for which limited alternatives to fossil fuels are available. These national strategic frameworks, where appropriate, must take into account the interests of regional and local authorities with the aim of ensuring the necessary measures, applied in compliance with the state aid rules contained in the TFEU (Treaty on the Functioning of the European Union) in order to achieve the objectives of this Directive are consistent and coordinated. National strategic frameworks must be in line with current EU legislation on environmental and climate protection.

Articles 4 to 6 govern the supply of electricity, natural gas and hydrogen for transport in line with the objectives of the national strategic frameworks defined by the member states, while for Article 7 Member States ensure that clear information is made available, consistent and relevant with regard to motor vehicles that can regularly use certain fuels placed on the market or be recharged via recharging points. Finally, articles 8 to 13 define the implementation of the national strategic framework every three years.

To support the achievement of the objectives of the National Strategic Framework, in its various forms, Legislative Decree 257/2016, regulates the implementation of Directive 2014/94 / EU on the construction of an infrastructure for alternative fuels, moreover, the article 3 paragraph 7 letter c , explicit not only the adoption of measures aimed at creating the infrastructure for alternative fuels in public transport services, but also the adoption of guidelines for the preparation of urban plans for sustainable mobility (PUMS) to be implemented by decree of the Ministry of Infrastructure and Transport, subject to the opinion of the Unified Conference.

Guidelines for drawing up PUMS

The decree of the Ministry of Infrastructure and Transport of 4 August 2017 has the task of define the guidelines for the preparation of urban sustainable mobility plans. They refer to the document "guidelines. developing and implementing a sustainable urban mobility plan", approved in 2014 by the European Commission's Directorate-General for Mobility and Transport. The guidelines provide for developing a vision of urban mobility system that tends to environmental, social and economic sustainability objectives through the definition of actions aimed at improving the effectiveness and efficiency of the mobility system and its integration with urban planning and territorial developments in order to guarantee accessibility levels.

The guidelines outline a uniform procedure for the drafting and approval of the PUMS, with the identification of the reference strategies, the macro and specific objectives and the actions that contribute to the concrete

implementation of the strategies, as well as the indicators to be used for the verification of the achievement of the goals of the PUMS (Article 2). The ministerial decree prescribes that metropolitan cities, large area bodies, municipalities and associations of municipalities with more than 100,000 inhabitants are called to draft and adopt the PUMS in order to access state funding for mass transport infrastructures, such as metropolitan railway systems, tram and metro.Institutions have two years to draft the PUMS, which have a time horizon of at least ten years and need to be revised each 5 years. Furthermore, the municipalities that have adopted a PUMS have two years to update the objectives of the plan in accordance with the guidelines (Article 3).
During the elaboration phase of the PUMS the importance of the listening phase and the participation of all stakeholders is underlined. Within the guidelines the procedure for adopting a PUMS is divided into the following phases:

- definition of the interdisciplinary/inter-institutional working group. The PUMS is drawn by a group with knowledge in the various disciplines of territory government, such as offices and sectors of urban planning, mobility, the environment, tourism, economic activities and others which will be joined by the various actors institutional of the territory and external technicians of proven experience in the field. The area mobility manager must also be part of the group;
- preparation of the cognitive framework. It represents a photo of the actual state of the area covered by the plan. It is articulated in different points: urban logistics, transport networks and services, legislation, mobility policies, cycle and pedestrian traffic flows, environmental impacts;
- start of the participated path. Each administration can choose the techniques and the approach of participation that it considers most appropriate to its territorial reality and economic availability;
- definition of objectives. Within the plan, there are (i) four minimum macro objectives (effectiveness and efficiency of the mobility system, energy and environmental sustainability, reduction of road accidents, socio-economic sustainability) to be achieved over a period of 10 years and (ii) specific objectives of lower hierarchical level, functional to the achievement of macro-objectives. All objectives must be monitored every two years to assess their achievement and actuality;
- participatory construction of the plan scenario. Once the cognitive framework is set and the objectives set, strategies and actions must be identified with the participatory process;
- strategic environmental assessment (SEA). The SEA procedure is contained in the legislative decree 152/2006 and is applied to the PUMS according to the SEA screening procedure;
- adoption of the plan and subsequent approval. The decree recommends (three) as passages (i) adoption of the PUMS in the municipal or metropolitan council; (ii) publication of the PUMS and collection of observations; (iii) counter-arguments to the observations or acceptance of the same and subsequent approval of the plan in the municipal or metropolitan council;
- monitoring every two years. During the preparation of the PUMS, mandatory monitoring activities to be started following the approval of the PUMS must also be envisaged. The monitoring is divided into the following phases: (i) collection of the data necessary for the estimation of the ex post indicators, to be evaluated every two years; (ii) comparison of the ex-ante and ex-post indicators for the evaluation of the effectiveness and efficiency of the interventions envisaged by the plan; (iii) reconsideration of the interventions if the expected results are not achieved, with indications of the integrations / changes to be made to the plan; (iv) any revision of the targets to be achieved.

Transport policy is therefore one of the main foundations on which the European strategy on urban sustainability is based. The impacts on the environment, on human health and on the economy, generated by the current configuration of the transport system, negatively affect the quality of life in urban areas. It follows the need to promote, in the various physiognomies that it can assume, urban transport the diffusion of new mobility models in a sustainable perspective that aims to improve people's quality of life.

Linee guida PUMS

In Italy, Puglia region is an example of drafting and approving regional guidelines with DGR n. 193/2018, which in the national context, intended to prepare them in continuity with the national document and introduces further details, cognitive data and assessments related to the specificities of the Apulian context.
The guidelines of the Puglia region on one hand identifies a programmatic and regulatory reference framework for the Apulian regional territory and on the other they define the aims that a PUMS must draw from and, finally, they define the objectives that a transport system pursues, which are: (i) the modal balance of mobility; (ii) reduction of road congestion; (iii) improvement of air quality; (iv) reduction of noise pollution; (v) reduction of motorization rate and finally increase in accessibility. As far as the results defined in the PUMS are concerned, useful information on the management of expected facts has been placed in a different point of view in different time periods. Finally, they define the process of drafting a PUMS, identifying the main phases and the procedural procedure for the purpose of approving the plan in line with the regional legislation of reference. The DGR n. 193/2018 provides examples of strategies and good practices and tools and outline a general framework of the main European and national funding programs on sustainable mobility, in order to support Administrations and professional experts in the development and implementation of a PUMS. The Regional Guidelines are intended in the first instance to Apulian Local Administrations that intend to engage in the development of an Urban Sustainable Mobility Plan (PUMS), but also to professionals who are experts in planning and mobility management and provide their support to local administrations.

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04

THE TIMES THEY ARE A – CHANGIN' 2(2019)

REVIEW PAGES: URBAN PRACTICES

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In this number

PLANNING FOR URBAN RESILIENCE IN SOUTHEAST ASIA: TWO CASE STUDIES

With a greater concentration of people and assets in urban areas, cities need to address an increasingly complex range of shocks and stresses to safeguard development gains and well-being. Managing disaster risk and the impacts of climate change have long been an important focus of urban resilience (Galderisi, Mazzeo & Pinto, 2016), but recent examples have shown how economic crises, health epidemics, and uncontrolled urbanization can also affect the ability of a city to sustain growth and provide services for its citizens, underscoring the need for a new approach to resilient urban development. In response of these concerns, in the last few decades, researchers from different disciplines have started investigating the meaning, aspects and elements of urban resilience, suggesting that resilience is a complex and multifaced concept with wide implications for planning practices (Salat & Bourdic, 2012), also arguing that achieving resilience in urban areas requires a strong partnership between local governments, research centers, the non-profit sector, businesses, and communities (Stumpp, 2013). Within this context, several initiatives involving both public and private stakeholders have been created in the last few years, aimed at fostering resilience in urban areas. A notable example in this direction is the 100 Resilient Cities initiative, pioneered by the Rockefeller Foundation. The initiative represents one of the most remarkable effort to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century. The 100 Resilient Cities programme defines urban resilience as "the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience". Based on this definition, a "City Resilience Framework" (CRF) has been established. The framework provides an innovative model for the local authorities to develop a holistic city strategy in collaboration with adjacent municipalities, local academic institutions, private stakeholders, and communities of the city and represents the foundation for the developments of a city resilient strategy. The programme has been established in 2013, in honor of Rockefeller's 100th anniversary and had initial funding of $100 million (although the level of funding support has grown since the programme was launched). Since then, 102 cities worldwide have joined the programme, and 68 Resilience Strategies (with nearly 3,000 concrete actions and initiatives) have been developed.

This contribution presents two relevant Resilient Strategies, developed in two cities of the Southeast Asia, within the 100 Resilient Cities framework: i) the Melaka (Malaysia) Resilient Strategy and ii) the Can Tho

(Vietnam) Resilient Strategy. Beside pertaining to the same geographic area, the two cities have been selected because they share a great portion of physical, social and economic challenges, including; a) a fragile city economy; b) aging and poorly maintained infrastructures; c) environmental degradation and d) persistent social inequalities.

RESILIENT MELAKA

Creating a thriving, liveable and smart Melaka

MELAKA is the oldest city of Malaysia and has an urban population of 484,885 inhabitants. The city not only boasts a rich history and cultural patrimony, represented by its word-famous historic center (that received recognition as UNESCO World Heritage Site in 2008), but it is also an international exhibition center, hosting every year numerous national and international conferences, congresses and trade fairs. While tourism represents one of the main economic activity, it is also causing serious problems by increasingly placing pressure on the city infrastructures. Furthermore, the city is experiencing high levels of traffic congestion that stem from a very weak and unattractive public transport network. Finally, an aging drainage system is creating significant flood risk in several locations, while a chronical water supply shortage, combined with poorly maintained hygiene and environmental sanitation infrastructures have caused in past years serious disease outbreaks, making public health an issue of mayor concern for citizens and policy makers.

In order to face these and other relevant urban challenges, on May 2019, the city of Melaka released its Resilience Strategy with the support of the 100 Resilient Cities initiative. The strategy sets a vision for "a vibrant city, where smart governance, collective leadership, sustainable mobility and protective infrastructure supports a thriving, healthy community that is proud of Melaka's outstanding universal values as a world heritage city." The strategy is organized into three pillars which reflect the city's vision and needs for Melaka's future:

- PILLAR I: THRIVING AND ENGAGED COMMUNITIES. This pillar emphasizes the fundamental role of the Melaka's community in building resilience. It brings together actions to equip Melaka's residents, households and business owners with the knowledge and skills to address the city's water, waste and health challenges effectively. It also encourages all citizens to celebrate and preserve Melaka's unique heritage and take part in the conversation about the city's future. Relevant initiatives related to this pillar include: i) the promotion of authentic heritage businesses and products; ii) the development of cultural heritage skills education programs aimed at creating employment and entrepreneurship opportunities, iii) the implementation of community rapid emergency response trainings. Beside these action, important efforts are also devoted toward enhancing citizens awareness by developing awareness campaign in the field of sustainable waste management, public health and sustainable water management.
- PILLAR II: A LIVABLE, VIBRANT AND EFFICIENTLY CONNECTED CITY. Pillar II brings together actions to improve the city's mobility network, public transport services, urban spaces and infrastructure so that they can create healthier environments for residents and visitors. These actions seek to improve resident's quality of life, but also aim to enhance the attractiveness of Melaka to visitors and investors. Actions within this pillar are targeted toward reaching the following three goals: i) developing sustainable transport options; ii) creating vibrant public spaces and iii) cleaning-up and protecting the environment.
- PILLAR III: COLLECTIVE LEADERSHIP AND SMART GOVERNANCE. Pillar III seeks to broaden Melaka's capacity to act upon key issues for Melaka's future by building a network of private and public

stakeholders; developing a data-driven and evidence-based approach to key decisions; and promoting integrated long-term planning across different departments and agencies. To this aim the strategy envisions, among other initiatives, the creation of Data Observatory, an IT infrastructure that integrates data from various agencies in Melaka, to share expertise and technology and facilitate a transparent, responsive, and well-informed society.

RESILIENT CAN THO
Can Tho Resilience Strategy until 2030

CAN THO is the fourth largest city in Vietnam and has an urban population of approximately 1,2 million inhabitants. It is noted for its floating market, rice paper-making village, and picturesque rural canals. Living conditions and livelihoods in the city were historically well adapted to the regular pattern of seasonal flooding, which residents and local governments describe as a "living-with-floods" strategy. However, during the past few years, flooding has become less predictable and more damaging due to a multitude of factors such as climate change, land subsidence and urban development. This created many challenges for the living-with-floods strategy. In addition, the city has been facing many other challenges such as extreme heat waves, infectious disease epidemics, environmental pollution, water resource depletion, and economic recessions.
These challenges also have grown in severity and unpredictability, and are often characterized by inter-disciplinary, inter-regional and even global linkages.
In response, the city of Can Tho released its Resilience Strategy on June 2019, within the context of the 100 Resilient Cities programme. The Strategy is framed by four interconnected pillars:

- PILLAR I: SYSTEMATIC, INTEGRATED AND PARTICIPATORY CITY PLANNING. This pillar is aimed at developing policies and plans in a systematic, integrated manner, with active participation of all relevant stakeholders. It will be implemented in three consecutive and interrelated steps. In the first place, the city will review and analyse key plans and policies of the in order to make recommendations to ensure that they are consistent, systemic and integrated. After this analysis, the city will put in place several initiatives aimed at improving the effectiveness of monitoring and evaluation of the implementation of city plans. Key decision will be thus taken by involving all relevant stakeholders. Particular attention will be paid to engage the Can Tho communities, with a special focus on young people and student.
- PILLAR II: A GREEN AND SUSTAINABLE RIVER CITY. This pillar addresses the environmental component of urban resilience. Its main aim is to protect natural green and blue areas while providing the city with an infrastructure system that is well-connected, modern, flexible, diverse and resilient to extreme natural hazards. Several actions will concur to the achievement of this objectives. These includes, among others: i) the development of a master green infrastructure plan for core urban areas, aimed at creating new green public spaces for community activities; ii) expanding and renewing the hydraulic infrastructures of the cities, making them more resilient to the changing climate, while improving the capacity of public services providers to organize and operate effectively and iii) the development of a well-connected and consistent GIS database on key urban infrastructure, and information management and user interface system to support the planning and management of urban infrastructure.
- PILLAR III: A KNOWLEDGE ECONOMY THAT IS PROACTIVE, DIVERSE, AND DEEPLY INTEGRATED. Pillar III brings together actions to improve city competitiveness in key economic domains such as tourism and agriculture. To meet this target, the strategy envisions several activities aimed at improving the

effectiveness and scale up the platform for regular dialogues between enterprises, investors, and scientists with city leadership and related department leaders. Beside these activities, the strategy also defines supporting mechanisms and policies to incentivize enterprises focusing on clean agriculture products, tourism and rural development that also supports livelihoods of the poor.

- PILLAR IV: GREEN AND CLEAN ENVIRONMENT. The main aim of the fourth pillar is to ensure that communities have secure and stable income, and live in a green and clean environment, buffered from the impacts of economic, social and environmental shocks and stresses. To meet this goal, the strategies proposes a series of coordinated actions, including: i) integrating the resilience approach into policies and programs for environmental safeguard ii) adjusting housing support policies and programs to strengthen the resilience of poor and vulnerable households and iii) conducting research to assess the conditions, characteristics and resilience of migrant groups in the core urban area of the city and propose support measures.

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THE TIMES THEY ARE A – CHANGIN' 2(2019)

REVIEW PAGES: NEWS AND EVENTS

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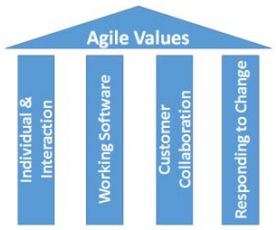

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AGILE DEVELOPMENT METHODOLOGY FOR URBAN POLICY IMPLEMENTATION

In recent years a lot of scientific literature has been produced on the topic of smart city, trying to understand how much the new tools proposed by the emergence of ICT could affect the configuration of cities (Papa et al., 2015; Aldegheishem, 2019). The focus has often been on product innovation, analysing the digital revolution as a powerful tool for optimizing existing processes; nonetheless, as has often happened in history, the great technological innovations have brought with them Copernican revolutions, grafting into society process innovations not imaginable at the beginning but able to modify the systems of relations that govern the socio-political structures of organisms such as cities.

One such case could be the adoption of "agile" methodologies as a governance tool capable of transforming the interaction between public administration and citizens in the definition and creation of services for the community.

In software engineering, the term agile methodology refers to a set of software development methods that have emerged since the early 2000s and are based on a set of common principles, directly or indirectly derived from the principles of the "Manifesto for Agile Software Development" (Beck et al., 2001). The agile methods contrast with the waterfall model and other traditional development models, proposing a less structured approach focused on the objective of delivering to the customer, in a short and frequent time, functioning and quality software. Among the practices promoted by agile methods are the formation of small, multi-functional and self-organized development teams, iterative and incremental development, adaptive planning, and the direct and continuous involvement of the client in the development process.

In addition to some scientific papers that analyse the relationship between agile methodology and urban planning and its positive and negative consequences on the cities development (Stevens & Dovey, 2019), a practical application is represented by the project urbanAPI – Interactive analysis, simulation and visualization tools for the implementation of Urban Agile policies – financed by the EU through the European Commission's Seventh Framework Programme. The project is led by Fraunhofer IGD and supported by UWE development partners, Bristol, AIT, GeoVille and partner cities Vienna, Bologna, Ruse and Vitoria-Gasteiz.

UrbanAPI aims to provide ICT-enabled solutions that adapt governance models to support stakeholder involvement and citizen participation, in order to improve the development and delivery of sustainable urban

policies. UrbanAPI applications can be used for decision support, conflict management, analysis and visualization and are based on innovative interaction platforms. They support policy makers, planners and stakeholders at different levels of governance and spatial: urban neighbourhood level, municipal level and urban region level. UrbanAPI adopts an agile development methodology with cyclical and multiple activities in parallel, developing a set of tools that creates advanced ICT-based intelligence in three urban planning contexts:

- the 3D Scenario Creator application directly addresses the issue of stakeholder engagement in the planning process through the development and delivery of advanced 3D visualizations of the virtual reality of neighborhood development proposals;
- mobility Explorer offers ICT solutions based on mobile phones that allow the analysis and visual representation of socio-economic activity across cities and in relation to the various elements of city land use;
- the Urban Development Simulator prototype provides ICT simulation tools for simulating the development of interactive urban areas that address urban growth and densification as a result of planning interventions.

The following 5 questions led to the selection of the conferences described below:

- Can the city be reimagined as a commons?
- Which urban processes have been affected by the smart revolution?
- How disruptive trends are already changing and transforming urban living around the world today?
- Can new ICT technologies affect social inclusion, sustainability and empowerment processes?
- Can the networking capabilities of new ICT technologies affect national policies?

THE CITY AS A COMMONS

The City as a Commons

Where: Pavia, Italy

When: 2-4 September, 2019

http://cityascommons.unipv.it/researchsymposium2019/

Can the city be reimagined as a commons?

It has become fashionable to talk about the "urban commons", and it's clear why. What we traditionally conceive of as "the public" is in retreat: public services are at the mercy of austerity policies, public housing is being sold off and public space is increasingly no such thing. In a relentlessly neoliberal climate, the commons seem to offer an alternative to the battle between public and private; nonetheless, we cannot have a common resource without a common strategy for managing it. And so, rather than a resource, the commons is a process, a set of social relations by which a group of people share responsibility for, yes, a garden or even the governance of their neighbourhood.

The 2019 edition of the Research Symposium is jointly organised by the University of Pavia and the University of Huddersfield and it will bring together scholars and experts on this topic to share theoretical and practical agendas, including best practices and outcomes from live case studies.; it aims at investigating the notion of Urban Commons and their spatial unfolding in relationship to the City. Taking into consideration the wider debate on Commons and its relevance to several disciplines (economics, geography, law, architecture, planning, etc.), the event aims at focusing on urban commons and broader spatial implications, both in terms of spatial practices and design agencies.

THE FOURTH INTERNATIONAL CONFERENCE ON SMART CITY APPLICATIONS (SCA 2019)
Where: Casablanca, Morocco
When: 2-4 October, 2019
http://www.medi-ast.org/sca19/

Which urban processes have been affected by the smart revolution?

SCA conference aims to bring together research scientists and industrial engineers to discuss and exchange both experimental and theoretical results, novel designs, case studies, and trend-setting ideas in the area of smart cities. The conference covers any topic with an intersection with smart cities, including education, healthcare, economy, digital business, building and home automation, environment and agriculture, information technologies and computer science. The Conference encourages submission of original works presenting novel research results and new products or concepts.

4TH ANNUAL INTELLIGENT CITIES SUMMIT
Where: Toronto, Canada
When: 7-8 October, 2019
https://iotevents.ca/event/intelligent-cities-19/

How disruptive trends are already changing and transforming urban living around the world today?

The 4th Annual Intelligent Cities Summit brings together leading global municipal professionals and tech experts to discuss, share ideas and case studies on how to utilize new technology to enhance our cities – making them more efficient, offering better city services and improving quality of life.

SMART CITY EXPO WORLD CONGRESS
Where: Barcelona, Spain
When: 19-21 November, 2019
http://www.smartcityexpo.com/en/home

Can new ICT technologies affect of social inclusion, sustainability and empowerment processes?

The conference proposes a format focused around 5 main tracks, allowing for in-depth discussion in a wide range of formats. Each track is made up of a range of themes, with dedicated sessions honing in on the most critical issues facing cities today.
The main tracks of the conference are the following:

- Digital transformation;
- Urban Environment;
- Mobility;
- Governance & Finance;
- Inclusive & Sharing Cities.

In particular, the last track has the following themes:

- Future of Work & Education;
- Bridging the Gap;
- Circular Economy;
- Sharing Economy;
- Right to the City.

EUROCITIES 2019 Prague

Where: Prague, Czech Republic

When: 20-22 November, 2019

http://www.eurocities.eu/eurocities/allcontent/EUROCITIES-2019-Prague-conference-programme-WSPO-BDABVP

Can the networking capabilities of new ICT technologies affect national policies?

EUROCITIES was founded in 1986 by the mayors of six large cities: Barcelona, Birmingham, Frankfurt, Lyon, Milan and Rotterdam. Through six thematic forums, a wide range of working groups, projects, activities and events, the group offers to the members a platform for sharing knowledge and exchanging ideas with the aim to influence the EU institutions to respond to common issues that affect the day-to-day lives of Europeans. Its objective is to reinforce the important role that local governments should play in a multilevel governance structure. The Eurocities 2019 conference - Cities at a crossroads – is one of the initiatives organized by the group to share with the participants the most recent issues of the debate on the enforcement of the rights of European local communities.

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