

# TeMA

Journal of  
Land Use, Mobility and Environment

This Special Issue contains a collection of sixteen extended papers from the XXV Living and Walking in Cities International Conference. It is a bi-annual occurrence aiming to gather researchers, experts, administrators, and practitioners and offer a platform for discussion about mobility and quality life in urban areas-related topics, specifically on vulnerable road users. The aim is to exchange ideas, theories, methodologies, experiences, and techniques about policy issues, best practices, and research findings.

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*Special Issue 1.2022*

**New scenarios for safe mobility  
in urban areas**

# TeMA

Journal of  
Land Use, Mobility and Environment

*Special Issue 1.2022*

## NEW SCENARIOS FOR SAFE MOBILITY IN URBAN AREAS

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*Special Issue 1.2022*

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## Sustainability charter and sustainable mobility

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### Abstract

In order to make our cities more sustainable, the paper describes a research aimed at defining a new urban tool in the context of Agenda 2030. It is the 'Sustainability Charter', a tool that already exists at the international level, but here is analysed at the local level as a result of decision-making process which refers to a set of interactions between academia (the university), industry and local community.

One of the priority of the Sustainability Charter is to analyse all the sustainable services that an administration has to implement in order to help citizens to have virtuous lifestyles. The authors developed a methodological approach to better define, implement and assess these sustainable actions related to different urban topics (mobility, waste management, energy production...). In particular, the paper proposes to adopt different indicators to measure the sustainability of each action using a specific chart defined as sustainability map. The method proposed by the authors aims to be easily adaptable and scalable to different local administrations. To give a concrete example of the results that can be obtained from its application, the paper proposes the experience of the Sustainability Charter of Sestri Levante, a medium-sized municipality in Italy in the Ligurian Riviera. Thanks to this experience, the Municipality of Sestri Levante can improve its mobility-related sustainability services.

### Keywords

Sustainability charter; Sustainable mobility; Participation; Agenda 2030.

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## 1. Introduction

Today, governments, research centre and local communities play a key role to support sustainability (Voytenko et al., 2016; Doppelt & McDonough, 2017) leading to an increase in commitment and studies on the one hand to spread education for sustainable development, and on the other to identify the most impactful and harmful factors on the environment. Sustainable Development requires a change in mentality: we need to reconsider our intentions, our propensity to consume resources, and this is not easy but it is a challenging goal (Duran et al., 2015). The growth of an ecological consciousness requires principles, values and processes together with a planning activity, aimed at developing "a new way" of engineering the world, which considers additional issues to the traditional ones (Beatly, 2015).

The use of sustainability indicators has become a widespread methodology (UN, OECD, EU) as a tool for reporting on the state of the economy or the state of the environment, to clarify objectives and establish priorities, to assess the performance of policies and to monitor progress towards sustainable development. Since the 70s' environmental issues and the future of our planet have increasingly entered our consciousness (Halmaghi, 2016) and different indicators have been used to assess the level of sustainability. Many international organizations, opinion movements, scholars and experts are committed to spreading the concept of sustainability. The systematic use of indicators is essential to be able to describe and quantify all those phenomena that describe sustainable development, they have a fundamental role both for reporting and for verifying the effectiveness of the implementation of a strategy.

The reference policy at international level is Agenda 2030 (Deacon, 2016; Ylönen & Salmivaara, 2021). The latter is the result of a long political process which, from the Rio conference in 1992 until today, has produced a progressive paradigm shift by modifying the very concept of sustainability. The Sustainable Development Goals take into account in a balanced way the three dimensions of sustainable development, namely economic, social and environmental. The 2030 Agenda is representing, also at a national level, the best way to initiate a structural path of reform towards sustainability (Colglazier, 2015; Miola & Schiltz, 2019). In fact, to support the definition of a new balance of the three dimensions of sustainable development, in Italy the National Strategy for Sustainable Development (NSSD) has been approved, following a long process of consultation and work among the central government, the Regions, civil society, the world of research and knowledge. The SNSvS is structured in five areas, called 5Ps: People, Planet, Prosperity, Peace and Partnership.

Among the goals, mention is made of Goal 11 "Sustainable cities and communities: make cities and human settlements inclusive, safe, durable and sustainable". The city in the 2030 Agenda is seen as "a rope that connects all the other goals", sustainable urban development is "...the sum of the ongoing transformation processes applied to help cities in transition (or urban areas) towards a more sustainable future" (Ministero dell'Ambiente Italiano, 2017: 39-40). Since the time of the industrial revolution, cities have been the main centres of economic and productive development, as well as responsible for 70% of global carbon dioxide emissions (Wu et al., 2020; Moriarty & Wang, 2014). For this reason cities are the main protagonists of the 2030 Agenda for Sustainable Development. It is necessary to start from the cities to test new policies and sustainable lifestyles. Among the innovative tools that urban administrations can use to become more sustainable, the paper analyses the Sustainability Charter. The Sustainability Charter analyses different sustainable services that a city has to implement in order to help citizens to have virtuous lifestyles. These services cover various issues that have an impact on the environment such as energy, waste management, food and mobility. In particular, the paper, through a case study, investigates the sustainable mobility services that should be included in the Sustainability Charter. Supporting sustainable mobility is a priority for cities that want to promote a better quality of life for their citizens. 74% of Europeans live and move every day in cities, and 40% of the total CO<sub>2</sub> emissions from transport is caused by urban mobility (Diez et al., 2018: 22).

## 1.2 Research contribution

The paper proposes a new methodology for developing the Sustainability Charter tool at the urban level. The Sustainability Charter is a tool to steer cities towards increasing environmental, economical and social sustainability. It was first adopted in North America as an agile and easily updated tool for defining the guiding principles in a city's decision-making process. Langely City's Sustainability Charter (Canada) is one of the first example dated back to 2006. This charter focused on several topics that have a great impact on the environment: transportation, energy, water, waste and telecommunications. For each of these topics, the charter analyses the city's current and future needs and defines new sustainable services such as a new walking and cycling infrastructure or parks to increase urban biodiversity. In general the Sustainability Charter is a high-level policy tool to guide the administration and the community towards a sustainable future. At the heart of this instrument are the social, cultural, economic and environmental needs of a community and the idea that these needs can continue to be met in the future but in a sustainable way. The Sustainability Charter foresees short-, medium- and long-term participatory goals, and define priority issues and key indicators to achieve adequate levels of sustainability. The main objective is to inspire residents to think, make decisions and act with an eye to the future in their daily lives.

To improve the sustainability charter tool, the authors proposed to include a set of indicators to assess the level of sustainability of existing and future services, i.e. linked to the implementation of the charter. Indicators provide a solid basis for decision-making processes at all levels of planning and can summarise complex information useful to the observer. They concentrate the complexity and quantity of information into a small meaningful subset of observations that gives us useful information for choosing and directing our actions. The success of current and future integrated policies can only be judged, guided and monitored by identifying key indicators that can be recorded and compared with concrete policy objectives. The scientific nature of the indicator lies, therefore, in making explicit the pattern that links the measurable entity with the non-measurable entity. This assumes that they are few in number, relevant, responsive, simple, and policy-specific (European Community Commission, 1999). The inclusion of the indicators proposed by the paper therefore helps to monitor the actions implemented by the Sustainability Charter and to measure their results.

In addition, the authors propose to design the sustainable services to be included in the Sustainability Charter using the methods suggested by the 2030 Agenda to promote more inclusive, safer and more sustainable cities. The idea is to make citizens and the municipalities feel as 'partners' in a common project. In this way is possible to increase citizens' sense of community and responsibility towards their own city and to encourage them to change their lifestyle. To achieve this, the authors suggest that the Sustainability Charter is co-designed by urban authorities with local communities involving also the academia and all the main stakeholder. Involvement and participation are at the center of this new tool that through innovation, technology and society intends to improve the quality of life in urban areas, enhancing the productive, environmental, landscape and cultural excellence. Thanks to the approach proposed by authors, the Sustainability Charter puts in contact those who provide sustainable services in the area (Service Provider/local administration) and the community members (i.e. who use these services). In addition the paper suggest to use incentives, promotions, prizes and discounts to motivate and involve the population in actions useful to achieve sustainable development. These solutions are in clear contrast with the "restrictive" logic often promoted (fines, structural works that prevent certain behaviours, ...). To assess the sustainability of the Charter, and therefore for the achievement of the objectives it intends to reach, the participation of all public and private actors living or passing through the metropolitan territory is fundamental. Thanks to citizens' involvement and consciousness in the long term, a butterfly effect is hoped for that attracts increasing interest and thus generates a circuit of virtuous behaviours both for the provision of sustainable services (sustainable mobility, separate waste collection, home composting, courses on

sustainability, sale of Km0 products, ...) and for the related incentives (prizes that can be obtained by using sustainable services). The fundamental aspects of the Sustainability Charter are therefore related to the concept of sustainability and sustainable development. Participation is placed at the centre of this new tool, exploiting the logic of the Quintuple Helix where innovation, technology and society work together to improve the quality of life. The concept of Quintuple Helix represents an evolution of what was theorized in the 90's by Etkovitz-Leydersdorff. Therefore, starting from the Triple Helix where the main actors - capable of creating a favourable context for the transfer of knowledge - were universities, private sector and public administration, today the Quadruple or Quintuple Helix concept is applied. In order to create a distributed and collective intelligence, which is fundamental for the sustainable development of a city and a territory, the fundamental actors are five - Public Administration, Research, Companies, People and Associations. In particular, the paper analyses in deep urban mobility among the different sustainable services that can be included in the Sustainability Charter, as it is one of the elements with the greatest impact on CO<sub>2</sub> production (Lopes Toledo & Lèbre La Rovere, 2018). Currently, in mobility policies, disincentives rather than incentives can be found (Basu & Ferreira, 2021). In fact, restrictive or sanctioning actions are often put in place to discourage the use of private vehicles in favour of public ones (ZTL, pedestrianization, parking areas with high costs, fines, etc..) or traffic calming interventions aimed at reducing speed and improving safety and quality of life in urban areas (narrowing of roadways, speed bumps, traffic circles, 30 zones, etc..). What has been described for mobility is also valid for other priority sectors such as energy, waste, tourism... Often, to achieve better levels of sustainability, policies act by imposing constraints. Incentives, on the other hand, are by definition a positive tool, useful for motivating people to take action. The promotion of discounts on LPT tickets, on waste taxation rather than on city services as a result of virtuous behaviour can contribute, together with a mix of restrictive policies, to sustainable development.

### 1.3 Methodology

The research analyse new methods to enhance the Sustainability Charter, such as sustainability indicators and co-designed sustainability services, to systematize actions in order to achieve adequate levels of sustainability for different urban issues, in particular for mobility.

The Sustainability Charter model presented in the paper is declined at the urban level. This is because it aims to create a close relationship between local governments and citizens so that every decision taken by the charter is shared.

Sustainability requires a change on the part of both local public authorities and inhabitants: the former must offer sustainable services and the latter must change their way of life.

The structure of the Sustainability Charter proposed by the paper includes a cognitive phase, an analytical phase and a planning phase (Fig.1).

The cognitive phase consists in finding information and starting data (urban planning tools, potentialities and aspects to be enhanced in the territory, initiatives and projects, information on traffic, on the main means of sustainable mobility and not present, data on tourism, ...). During the analytical phase, through the SWOT analysis, this information is analyzed, identifying the strengths, weaknesses, opportunities and threats of the area under study. As for the planning phase, objectives and actions/interventions to be implemented are identified.

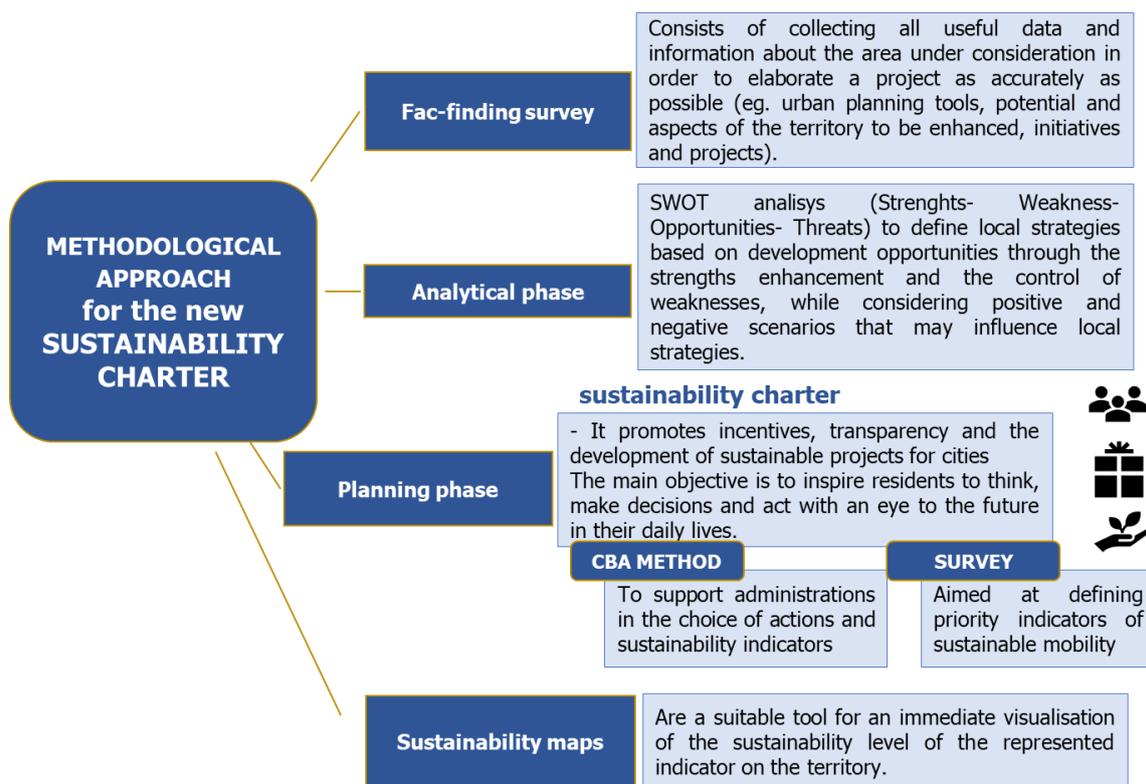
To assess the sustainability of the proposed interventions, specific indicators are identified and the CBA method is applied (Pirlone, 2010).

To make the results even clearer, it is proposed to create specific sustainability maps for the indicators applied to the case study. Once the objectives have been defined, it is necessary to plan the actions. To do this it was decided to introduce in the new Sustainability Charter, the CBA method or of the three variants (Ugolini, 2010).

The CBA method has provided three different reference thresholds:

- C: current level obtained with the relative values of each indicator;
- B: the level required by the law, obtained by analyzing the laws in force; this level should to be reached in a short time through a series of sustainable actions;
- A: the optimal target to reach.

Once the indicators have been quantified, it is possible to identify the priority ones and see whether they meet the sustainability levels by comparing level C (existing level of sustainability) with level B (compulsory level according to the European, national and local law) or C (optimal level to be reached). With the CBA method, initially the current level of sustainability of each indicators is fixed: subsequently, through specially surveys, indicators can obtained different weights of the indicators. Moreover, using this weight methodology it is possible to determine on which indicators it is possible to act as a priority in order to achieve greater sustainability and move from level C or B to level A, defining actions and/or interventions to be implemented. This approach can be applied to the different scales of reference in order to identify actions to achieve adequate levels of sustainability, verifying their effects through continuous monitoring over a medium to long period. Questionnaires are used to identify the most important indicators, i.e. to understand the priority issues in sustainability strategies. From the answers it would be possible to define the relative weights of different actions within the environmental context, then through interviews it would be possible to determine the importance of the indicators and consequently define the priorities of the single interventions to be introduced.



**Fig.1 Methodological approach for the new sustainability charter**

This method represents a point of arrival of previous experiences; a "tool", in itself innovative, both for conceptual approach and for related evaluation techniques, which seems to be a valid support for decision-making in governance processes. It is support system able to "measure" (in comparative terms, certainly not absolute) the level of sustainability in force and expected in a reference sectors of the urban and territorial areas considered (mobility, waste management...). The results of the CBA method, for greater clarity, should

be reworked into specific maps, the sustainability maps, a suitable tool for an immediate visualization of the level of sustainability of the territory that can be directly superimposed and compared with the maps of the urban planning tools in force. This approach allows to identify lines of action or actions to be implemented to achieve adequate levels of sustainability, verifying the effects through appropriate monitoring.

## 1.4 Case study Sestri Levante

Given the interest of Sestri Levante in the field of sustainability, specifically in mobility and tourism, the paper presents a first Sustainability Charter drawn up for this municipality.

This section contains the information and data initially found in the data cognitive phase.

Sestri Levante is a coastal municipality of 17.970 inhabitants in the metropolitan city of Genoa (Fig.2). It is located on the eastern Ligurian Riviera, and is one of the last towns on the eastern side of the Gulf of Tigullio, east of Genoa. Sestri Levante is a coastal city known above all for its cultural and seaside tourism. The historic centre overlooks two bays, divided by an isthmus that joins the promontory, the oldest part of the village, to the mainland.

Case study Sestri Levante	
Area	33.33 km <sup>2</sup> (12.87 sq mi)
Elevation	1 m (3 ft)
Population (December 2020)	17.867
Density	550/km <sup>2</sup> (1,400/sq mi)
Website	<a href="#">Official website</a>
<b>Location of Sestri Levante</b> Italy Ligurian Region Metropolitan City of Genoa <b>Bay of Silence –Sestri Levante</b>	
	

**Fig.2 Case study Sestri Levante**

The authors chose this city as a case study because it has several characteristics that make it a typical case in the Mediterranean area:

- seaside tourism;
- old historic centre with narrow streets;
- relatively new districts of second homes;
- seaside promenade;
- number of inhabitants changing considerably in summer compared to winter.

The strategies therefore implemented in Sestri Levante can be easily transferred to other coastal realities with the above-mentioned characteristics.

Recently, two urban planning instruments have been approved by the municipality of Sestri Levante: one at municipal level, the PUC - Municipal Urban Plan and one at metropolitan level, the PUMS - Sustainable Mobility Urban Plan of the Metropolitan City of Genoa. Taking into account the characteristics of Sestri

levante these plans have identified as main themes for the city: tourism, mobility and littoral zone management.

The Environmental Office of the Municipality of Sestri Levante has activated a process to support associations and various subjects of the territory in the organization and promotion of sustainability.

Among the initiatives, Sestri Levante wanted to focus on projects oriented to environmental sustainability, to improve the quality of life of citizens. For this reason, the Municipality worked on the expansion of public green areas, doubling their extension with two new parks and regenerating the existing ones; it followed the "Zero Waste Strategy" by switching to a new waste collection system that has allowed to increase from 32 to 75 the percentage of waste sorted collection and by opening the "Reuse Market", a place where it is possible to deliver objects that are no longer used and that can be picked up, free of charge, by other people. It has been promoted the use of public drinking fountains, which has saved over 970,000 plastic bottles, eliminated plastic from canteens and kindergartens, promoted the installation of a milk distributor and supported the "diaper library": a reference point for parents who have chosen to use washable diapers instead of disposable ones. The Municipality also launched a project to support festival/event organizers to eliminate the use of plastic and disposable tableware. Moreover, the city completed the substitution of the entire public lighting network with LED technology, which allows an energy saving of 58%; it also supports the association "Sentieri a Levante" (Paths in the Sestri Levante), which takes care of the hiking trail network of the territory; it has started a network of Urban Gardens - also with the involvement of schools - and supported initiatives to promote the use of bicycles. In addition, the Municipality of Sestri Levante is also beginning to work on the theme of a sustainable coastal municipality through the establishment of a "Blue Table" that brings together all those who have in some way to do with the sea. The agenda will also include issues related to sustainable mobility, a challenge that will have to take into account all the connections related to the economic and tourist sphere.

With regard to sustainable mobility Sestri Levante also for 2020 is reconfirmed, for the third consecutive year, one of the best "Bicycle Municipalities" because the city offers excellent cycling lanes and takes care of policies related to sustainable mobility. "Bicycle Municipalities" is an initiative that measures and certifies how much Italian municipalities are bike friendly. It is a project that accompanies and rewards local administrations in the development of bike-friendly policies and sustainable mobility by evaluating the degree of cycling through four parameters: urban infrastructure, cycling tourism, governance and communication & promotion. The award was given to Sestri Levante for the presence of 5 km of bike paths that run through the city and that are combined with the presence of 8 bike parks, different bike rentals and a bike sharing service available for both citizens and visitors to the city. A service that has recently been improved, in particular for e-bikes that can be rented through the new "BiciinCittà" app available for Iphone and Android to manage the entire process from the purchase of the subscription to the release of the bike. There are also numerous initiatives and events through which the City of Sestri Levante, often with the valuable collaboration of FIAB Tigullio Vivinbici, promotes a more sustainable mobility, including "Bimbinbici", the Bicibus service with 3 active lines, or the participation at the European Mobility Week, and the recovery of used bicycles at the Reuse Market centre...

Moreover, the Administration to improve the quality of life of the inhabitants and to become child friendly, has established new pedestrian zones such as the waterfront, in the section between the intersection with Viale Mazzini and the intersection with Via Milano, from July 1, 2020 to August 31, 2020, every day from 18.00 to 06. 00 the next day, both for safety issues and for the liveability of the spaces. This decision was followed by another intervention: the institution of a new "30 zone" involving not only the waterfront, but also Vittorio Veneto promenade, via Rimembranza, via Pilade Queirolo and piazzale Marinali d'Italia and the

relative internal road network. Moreover, the Municipality of Sestri Levante has promoted the installation of two points for recharging electric cars: a first step to support a more sustainable mobility.

Finally, the Municipality won another important award the “Blue Flag” related to the quality of seawater. This certificate has rewarded the work carried out by the local administration to protect the marine environment and the cost. In addition, several good practices have been developed to make beach tourism more sustainable: separate waste collection on the beaches, public beaches equipped and accessible for disabled people or pets.

## 1.5 Result

Sestri Levante is famous for its cultural and seaside tourism, which presents several criticalities related to urban mobility, as the analyses of the area in the cognitive phase (section 1.4) have shown.

In the analytical phase of the Sustainability Charter, the results of the SWOT analysis emerge: problems and criticalities \_ to be improved\_ and important opportunities for tourism development in the city.

As for mobility, the city is quite well connected as the territory is not vast. In the tourist centre of Sestri Levante, as well as in the historical centres of the other towns on the Ligurian coast, there is a considerable gap between the resident population in winter and in summer (almost three times as much). Added to this is the fact that in summer people are concentrated on the coastal strip and in the town centre, where there is a greater presence of public and private services, bathing establishments, leisure facilities, shops, restaurants, etc. This concentration of people and movements generates an intense traffic of vehicles, both sustainable and not, of parked cars and people that engage in particular the sea promenade. Among the “Weaknesses”, certainly the high traffic congestion and the pollution emissions. Other aspects are: low use of public transport due to sub-optimal supply; excessive number of private vehicles, the motorization rate is quite high; pavements that are not passable for long stretches; inadequate number of parking spaces and interchange car parks; limited number of bike sharing facilities. Municipality should engage in the maintenance of roads and pavements and incentivize individual users to use more sustainable modes of transport.

However, the city has many “Strengths” to be able to improve its mobility towards sustainability. In the area there are parks and paths, the Municipality could better use, as “Opportunities”, the European Funds and the Regional Calls to redevelop these places, making them more accessible. Due to its conformation, the city has vast areas facing the sea, these should be planned by developing urban regeneration projects that aim at green and sustainable mobility (new cycle and pedestrian paths, new 30 zones, restricted traffic areas, bike and car sharing). As far as demographics are concerned, the number of resident people is limited even if the population is aging, but in the summer season the numbers double. Seasonal mass tourism constitutes a “Threat” for Sestri Levante. The trade and tourism thanks to the beauty of its place are strengths of the city. Being a seaside town, the seaside sector is of great value, thanks to the two bays and cliffs typical of many Ligurian towns. Regarding the theme of tourism, there are various critical issues that start from the lack of a shared enhancement strategy between the various stakeholders (public administration, private industries, tourism companies, businesses dedicated to accommodation but also to mobility). Other weaknesses concern the presence of industrial settlements in areas of tourist interest, such as the shipyards in the Riva hamlet, born in the last years of the nineteenth century, and the FIT (Fabbrica Italiana Tubi), one of the largest steel mills in Italy. As for the planning tools, the PUC (Municipal Level Plan) does not adequately deal with sustainable mobility in relation to the large tourist presence and the SUMP (Sustainable Urban Mobility Plan) itself, approved by the Metropolitan City of Genoa in 2019, should be improved. SUMP could also be an opportunity to pursue.

From this analysis emerge the main issues to focus on: we need to make the city more sustainable. For mobility, the objectives identified in the Sestri Levante Sustainability Charter are: to reduce traffic congestion; to decrease CO<sub>2</sub> emissions; to promote soft mobility.

To complete the planning phase, a questionnaire was administered to a heterogeneous representative sample of Sestri Levante's stakeholders through which priority indicators were identified. Thanks to the CBA method they were then quantified and implemented.

Fig. 3 shows the indicators that in the current situation (level C of the CBA method) do not reach the levels of sustainability foreseen by legislation or emerged from the questionnaire (Level A) for which it is therefore necessary to propose actions/interventions.

PARAMETER FOR THE CBA ANALYSIS	C CURRENT STATE		B LEVEL RECOMMENDED BY THE REGULATION IN FORCE		A OPTIMAL TARGET FOR THE 2030	
	Value	UM	Value	UM	Value	UM
CO <sub>2</sub>	1,8	µg/m <sup>3</sup>	10	µg/m <sup>3</sup>	- 37,5%	µg/m <sup>3</sup>
PM <sub>10</sub>	19,23	µg/m <sup>3</sup>	40	µg/m <sup>3</sup>	- 20%	µg/m <sup>3</sup>
NO <sub>x</sub>	18,52	µg/m <sup>3</sup>	30/40	µg/m <sup>3</sup>	- 50%	µg/m <sup>3</sup>
SO <sub>2</sub>	21	µg/m <sup>3</sup>	20	µg/m <sup>3</sup>	- 20/25%	µg/m <sup>3</sup>
<b>Number of bike sharing places</b>	40	number	Not enough	number	88	number
<b>Total km of cycling and walking routes</b>	3,95	Km	Not enough	Km	6,26	Km
<b>Km<sub>2</sub> of pedestrian areas, Controlled Traffic Zone(ZTL) and 30 zones</b>	52,75	Km2	Not enough	Km2	70	Km2
<b>Electricity supply columns</b>	4	number	Not enough	number	10	number
<b>Motorisation rate</b>	531	car/100 residents	Too high	car/100 residents	450/470	car/100 residents
<b>Number of interchange car parks</b>	1104	number	Not enough	number	1740	number

Fig.3 Extract from the planning phase - CBA method of the Sestri Levante Sustainability Charter

In this regard, a Masterplan was defined with the actions/interventions for the Charter of Sustainability in order to modernize the sea promenade, through structural interventions: road network, parking spaces and soft mobility.

New bike sharing stations are proposed (yellow circles in the figure); in this way the number of bike sharing stations would exceed 88, the number set by the CBA to be met by 2030. Regarding bike routes, blue lines show possible bike routes that could be implemented in the coming years (Fig.4).

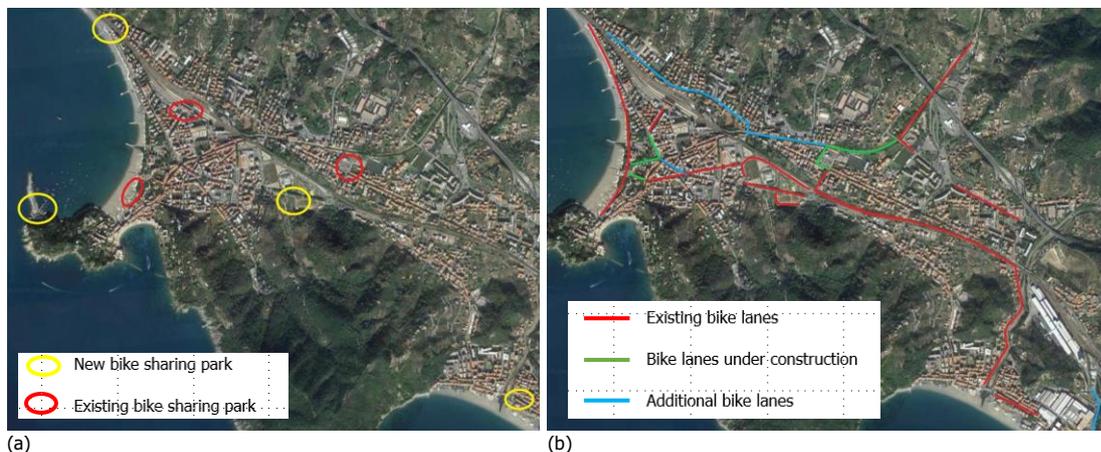


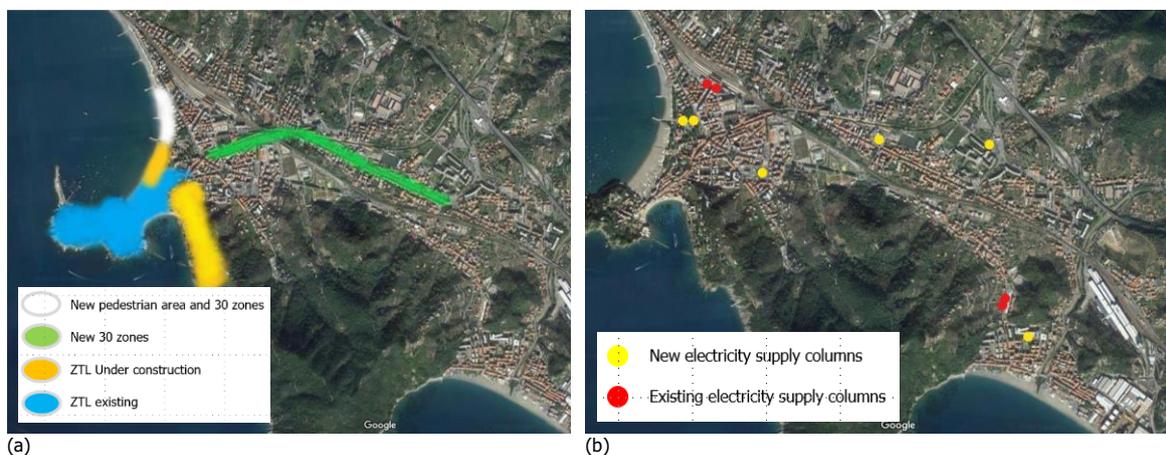
Fig.4 Masterplan of Sestri Levante: a) bike sharing stations and b) bike lanes

The municipality has implemented several actions to allow tourists to move in a sustainable way: bike sharing, bike rentals, shuttle ... In addition, always to improve tourism mobility, Sestri Levante studied the possibility to define a new pedestrian zone to the existing ones (in white in the Fig.5).

Different solutions have been analysed:

- full-time pedestrian streets, where vehicular traffic is excluded and prohibited except for emergency vehicles (Pedestrian Islands);
- part-time pedestrian streets, where vehicular traffic is excluded at certain times of day or on certain days of the week (Limited Traffic Zones);
- partial pedestrian streets, with limited access to public transportation at reduced speeds;
- partial pedestrian streets, with traffic calming measures that reduce the speed of motor vehicles.

All these types of areas or zones are delimited by special gates where only few vehicles authorized to enter, which in fact do not prevent access immediately but have a deterrent effect because of the penalty in case of transgression (punitive policy).



**Fig.5 Masterplan of Sestri Levante: a) 30 zones, ZTL, pedestrian area and b) electricity supply columns**

In contrast to these policies, Sestri Levante's Sustainability Charter, as described in the section on baseline research, is a tool aimed at directing the individual citizen to a progressive advancement toward ever greater environmental sustainability through the use of incentives. "The use of incentives is an innovative way within policies to support sustainable mobility. More and more countries are doing research in this direction. "The breakthrough of this model is that it increases awareness towards sustainable mobility, while increasing the perceived attractiveness of stakeholders through the distribution of benefits; citizens and municipalities can initiate a new consumption model that stimulates the urban economy and the use of sustainable mobility" (Herrador et al., 2015: 6119). "An effective incentive is one that motivates individual travellers to modify their travel behaviour in a way that achieves the goals of local governments: reducing automobile use, protecting the environment, and promoting community well-being by using soft mobility during urban travel" (Poslad, 2015: 13069)" (Pirlone et al., 2020).

Regarding incentives to be promoted in Sestri Levante through rewards, there may be several alternatives and to address this the Charter proposes an integrated online electronic payment system for payment of transportation services and stops, such as tickets in all public collective transportation, private vehicle parking, and especially for bike sharing, car sharing and cabs. This system would enable integrated payment for all best practices in the Sustainable Services Charter. It would be available online on smartphones with an App. The purpose would be that every time a good practice is implemented the system would assign a number of points to the user, and then be able to distribute incentives or rewards to those who contribute to

making the city more sustainable. The options are varied and all depend on who provides the service and who has the task of verifying that good practices are in use, here are some incentives proposed by the Charter:

- parking fee reduction;
- every 4 hours of car sharing use, 20 minutes free;
- 5% reduction of the annual subscription; reduction of the rate of nearby parking lots (if subscribed to Trenitalia, this would attest to moving beyond the municipality of a public transport);
- 10% discount on the future purchase of the bike, in affiliated stores;
- free entrance to the Ariston cinema, discount vouchers at the sports corner;
- incentives for the purchase of low-impact vehicles or for the installation of devices capable of reducing polluting emissions.

Thanks to new planned interventions and virtuous behaviour of its residents in the Charter, it is really possible to achieve adequate levels of sustainability.

### 1.6 Discussion

The application of the CBA method useful to support public administration in the choice of the interventions to propose is shown in Fig.6.

The left column shows the C level of Sestri Levante, that is the current level, in the central column the interventions proposed to reach a more sustainable city, and in the rightmost column the values with which, through the already mentioned good practices, a sustainable city will be achieved. This form in synthesis represents the letter A of the CBA method.

	<b>Level C</b>	<b>Actions / interventions</b>	<b>Level A</b>
<b>Bike sharing stations</b>	40	<b>Areas identified :</b> Sestri Levante harbour; Sant Anna; Mandela Park; Piazza Brigade Partigiane	88
<b>Bike lanes (Km<sup>2</sup>)</b>	4	<b>Areas identified :</b> Via Vincenzo Fasce; Via Vattuone; Via A. Terzi; Via XX settembre; Via Sertorio; Via Maria Teresa; Via Dante Sadini	6,3
<b>Pedestrian zones, ZTL, 30 zones (Km<sup>2</sup>)</b>	52,7	<b>Areas identified for ZTL :</b> Via Dante Sadini; Viale Rimembranza <b>Areas identified for pedestrian zones :</b> Lugomare Desclzo-Via Vittorio Veneto <b>30 zones :</b> via Nazionale	70
<b>EV charging stations</b>	4	<b>Areas identified :</b> Sturla Park station; Via della Chiusa; Via Nazionale; Via Giovanni Caboto	10
<b>Park places</b>	1104	<b>Areas identified :</b> Via val di canepa; Piazza della Repubblica; Via Vincenzo Fasce; Via Antica Romana occidentale	1740

**Fig.6 Application of the CBA method useful to support the administration in the choice of the proposed interventions**

Fig.7 instead shows the map of sustainability referred to Sestri Levante. The first refers to the current state and therefore to the column of Level C of the CBA method (in red the unsustainable parts of the territory and in green those instead sustainable). The second refers to the future after the realization of the proposed interventions, which corresponds to level A of the CBA method and therefore to the optimal level of sustainability.



**Fig.7 Mobility sustainability maps of Sestri Levante: Level C and Level A of the CBA methodology**

The indications of the Charter of Sustainability therefore provide guidelines to be considered at regime in already existing urban tools. The strategies and related actions outlined in the Charter to promote sustainable mobility should be incorporated into the existing SUMP, Sustainable Urban Mobility Plan.

The SUMP of the Genoa Metropolitan City concerns the scope of the Genoese metropolitan city, which coincides with the territory of the former province of Genoa. The mobility most analyzed in the Plan is that relating to the capital of Genoa and the connections with the other municipalities. An in-depth study of the mobility of the individual realities is also necessary, as mentioned in the paper. In this regard, the new Sustainability Charter of Sestri Levante, for the mobility part, contributes to providing the SUMP in question with analyzes and actions to be implemented for this coastal reality.

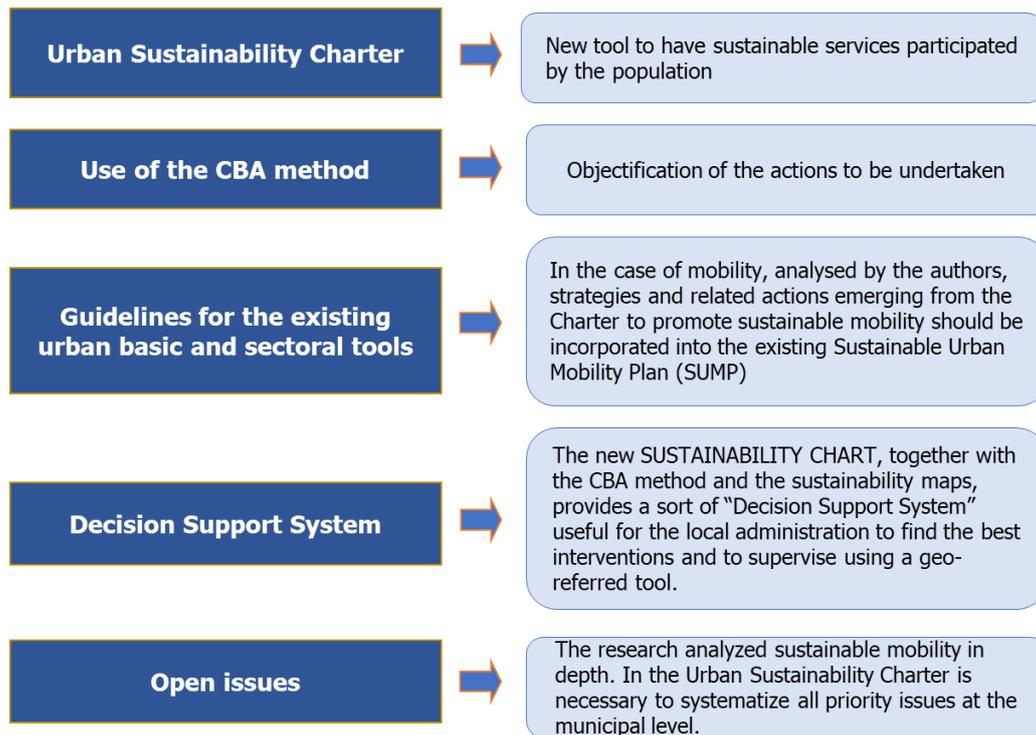
As known, the SUMP are strategic plans that take into consideration, through participation, the principles of integration and evaluation to meet the current and future mobility needs of individuals, in order to improve the quality of life in cities and their neighborhoods. The Plan of the Genoa Metropolitan City intends to define and implement a "mobility system project" to achieve the following objectives:

- meet the mobility needs of the population;
- encourage the use of alternative means of transport with the lowest possible environmental impact;
- minimize the individual use of private cars and moderate traffic;
- reduce energy consumption;
- reduce congestion in the historic center and near the seaside promenade;
- increase the percentage of congestion in urban areas characterized by a high traffic density, by identifying integrated transport system and infrastructure solutions capable of promoting a better planning of the territory and urban systems.

The Sustainability Charter, on the other hand, constitutes a specific tool on sustainability that can give important indications for achieving adequate levels of sustainability, also in line with the logic of the 2030 Agenda for cities.

## 1.7 Conclusion

The new Sustainability Charter, with the introduction of the participatory CBA method, allows to assess in a scientific way the actions to be undertaken and together with the sustainability maps, provide a sort of Decision Support System for the Administration.



**Fig.8 Integration of the New Municipal Sustainability Charter and SUMP**

In conclusion, the objective was to reason and promote a new model of development. All this implies not only a big cultural and organizational change in current development models, but also a new way of managing public administration. A management more open to dialogue, to mechanisms of efficiency and effectiveness, aimed at better governance of the entire local or territorial community according to a shared and innovative model of sustainability. The Charter will have to be updated and implemented in order to adapt to the natural change of the city.

The Sustainability Charter, with regard to mobility, gives an objective picture of what exists, the analysis and the actions to be taken for a municipality. This contribution can be reported in the SUMP. Furthermore, for example, the creation of sustainability maps can allow a PUMS to carry out different scenarios and therefore provide for specific urban mobility interventions (revisiting the urban space with new pedestrianization, introduction of new or upgrades of cycle paths, proposals for new, more sustainable such as electric vehicles, new interventions aimed at intermodality ....). Furthermore, the introduction of incentives and the involvement of the population, aimed at creating active citizenship, can help change lifestyle behaviors also in terms of mobility, a goal that the SUMP itself has set itself.

In fact, only through strategic planning is it possible to define and implement interventions and best practices that lead to safe (also in terms of the health emergency, as we have been experiencing in recent years) and sustainable mobility while also contributing to improving the quality of life in urban areas.

## Author Contributions

Introduction I.S.; Methodology and Conclusions I.S and F.P; Research Contribution F.P.; Results I.S., F.P. and S.C; Case study S.C.. All authors have read and agreed to the published version of the manuscript.

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## Image Sources

Fig.1: "Methodological approach for the new sustainability charter" is an elaboration of the authors;

Fig.2: "Case study Sestri Levante" is an elaboration of the authors;

Fig.3: "Extract from the planning phase - CBA method of the Sestri Levante Sustainability Charter" is an elaboration of the authors;

Fig.4 "Masterplan of Sestri Levante: bike sharing stations and bike lanes" is an elaboration of the authors;

Fig.5 "Masterplan of Sestri Levante: 30 zones, ZTL, pedestrian area and electricity supply columns" is an elaboration of the authors;

Fig.6: "Application of the CBA method useful to support the administration in the choice of the proposed interventions " is an elaboration of the authors;

Fig.7: Mobility sustainability maps of Sestri Levante: Level C and Level A of the CBA methodology

Fig.8: "Integration of the New Municipal Sustainability Charter and SUMP" is an elaboration of the authors.

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