Teaching Decarbonisation

Methodologies and experiences from CITY MINDED

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edited by Anna Laura Palazzo, Lorenzo Barbieri, Romina D'Ascanio,
Federica Di Pietrantonio and Francesca Paola Mondelli

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CITY MINDED
City Monitoring and Integrated Design for Decarbonisation

Co-funded by the Erasmus+ Programme of the European Union

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Anna Laura Palazzo, Lorenzo Barbieri, Romina D'Ascanio, Federica Di Pietrantonio and Francesca Paola Mondelli

IRENA · Università di Siena 1240 · Roma Tre Università degli Studi · Dipartimento di Architettura · Universidad Pablo de Olavide Sevilla · MIEMA

Lead Partner Foreword

Andrea Poldrugovac, IRENA

Today, around 75% of the European population lives in urban areas and an estimated prediction is that this number will rise up to 80 % in 2050. Sustainability of the cities and urban areas is a key challenge in Europe and ensuring a sustainable urban environment is a crucial task for all actors. Cities are leading Europe's economy and are key players in Europe's transition towards a low-carbon economy. The decarbonisation measures needed to ensure carbon neutrality of the urban areas include different topics and possible solutions and actions. The best place to take action is the local level and by conducting proper actions resolve environmental challenges, whilst ensuring a good quality of life for their citizens. In order to implement proper actions, it is crucial that the actions are developed, organised and implemented by professionals who are able to coordinate actions from different sources.

The lack of such type of processional profiles was the trigger to prepare the project CITY MINDED – City Monitoring and Integrated Design for Decarbonisation. The three-year project is funded under the Key Action 203 – Strategic Partnerships for higher education of the Erasmus+ Programme and it started with its implementation at the end of 2019.

Erasmus+ is the EU Programme in the fields of education, training, youth and sport. It is designed to support Programme Countries' efforts to efficiently use the potential of Europe's talent and social assets in a lifelong learning perspective, linking support to formal, non-formal and informal learning throughout the education, training and youth fields. The Programme also enhances the opportunities for cooperation and mobility with Partner Countries, notably in the fields of higher education and youth. Within this framework, transnational Strategic Partnerships aim to support the development, transfer and/or implementation of innovative practices as well as cooperation, peer learning and exchange of experience among different types of organisations involved in education, training and youth at the European level.

The CITY MINDED project involves five European partners - three Universities and two Energy Agencies: the lead partner, IRENA - Istrian Regional Energy Agency (HR); the Italian Universities of Roma Tre – Department of Architecture and University of Siena - Department of Earth, Environmental, and Physical Sciences (IT); the University 'Pablo de Olavide' - Department of Geography (ES); and the Malta Intelligent Energy Management Agency (MT). Partners were chosen according to their experience in fields related to environmental sustainability in urban areas, and with the twofold objective to ensure a wide geographical coverage (and thus a variety of urban contexts with diverse characteristics) and to address different thematic areas (geography, architecture and urban design, environment,

On the left:
Jardins des Moines, Parigi
Credits: Anna Laura Palazzo

energy) in order to gather together diverse approaches to the project topic, and take advantage of cross-disciplinary interaction and sectorial expertise.
The different expertise brought by participating organizations were exploited during the project implementation to:

- Define a draft methodology to address the multiple facets of decarbonisation within multi-disciplinary workshops,
- Test the draft methodology within 3 local workshops touching different target cities (Seville, Siena, Rome), each one involving HEI students from the hosting partner university, experts from a partner organisation and local stakeholders in the drafting of city decarbonisation roadmaps for target neighbourhoods/districts,
- Fine-tune and integrate the draft methodology according to the results of the workshops,
- Create a set of educational tools, including a modular online course on urban decarbonisation, a toolkit for teachers to replicate the CITY MINDED workshops, and an open web platform where all the materials produced by the project will remain freely accessible to students and professors beyond the project lifetime,
- Carry out a 2-weeks Intensive Course in Malta, involving students and teachers from participating universities in the drafting of a sustainable development agenda for a target area in the city of Valletta.

Participants included students, enrolled in geography, urban planning, architecture and environment courses, who experienced real life planning processes in a stimulating, international and multidisciplinary learning environment, acquired trans-disciplinary competences and improved their ability to deal with complex, interdisciplinary urban issues, to work in team, to correctly interpret the urban context and identify shared solutions to common problems. This is expected to resulting, in the long term, in their increased employability in both the public and the private sector, as energy managers, consultants, urban planners, policy makers, etc. Participating teachers/trainers also benefited from the innovative educational experience set up by the project, by testing a teaching practice that can be replicated in regular academic and training activities, increasing the appeal and relevance of their courses.
This publication will be a unique opportunity to share the knowledge on how the workshops were structured and conducted, particularly in the situation when the activities had to be adapted to the pandemic situation. It will be interesting to compare the reflections on the teaching and learning experiences in online and the real environment and how the initially developed draft methodology was adapted according to the results of each workshop.

The background of the CITYMINDED project: urban sustainability in EU cooperation

Federica Di Pietrantonio, Università degli Studi Roma Tre

The CITYMINDED project was prompted by the recognition of the capital importance of urban sustainability in contemporary Europe. Nowadays, around 75% of Europeans live in cities[1] and this number will rise: Europe's level of urbanisation is expected to increase to approximately 83.7% in 2050[2]. On the other hand, cities generate about 70% of global GHG emissions. This concentration of population, infrastructure and human activities makes cities particularly vulnerable to the negative impacts of climate change[3].

For these reasons, urban areas are currently the most important test-bed for energy transition and decarbonisation models. However, decarbonisation touches upon a wide variety of topics, ranging from energy to sustainable mobility, urban design, awareness raising, urban waste management, etc.

This calls for a systemic interdisciplinary approach, which, at the time the project was drafted, was not widespread in ordinary academic teaching practices, but was nonetheless deemed necessary by partner organizations to form more employable professional profiles, able to coordinate different disciplinary domains, sources of information, stakeholders and competences. Project partners were also aware that teaching practices in the fields related to urban matters often lacked real-world experiences and contacts beyond classroom activities, thus preventing students to correctly interpret contexts and interact with the territorial actors playing a role in the achievement of urban decarbonisation objectives.

CITYMINDED intended to fill this gap, by developing and testing an innovative, creative, European-scaled learning environment called 'city decarbonisation itinerant workshop', where students, specialists and stakeholders could jointly address decarbonisation challenges through a 'learning-by-doing' method.

This approach did not appear from nowhere, but rather resulted from the capitalization of previous experiences carried on by partner organizations. On one hand, CITYMINDED built on the results of the FP7 City-Zen[4] project (with the University of Siena as partner), which used urban neighbourhoods as living labs, assessing their carbon footprint and designing feasible decarbonisation agendas with the direct involvement of local stakeholders and citizens in a series of brief, intense training and co-working sessions called 'Roadshows'. The field of application proposed by CITYMINDED was thoroughly innovative: the City-Zen method and tools were adapted to a Higher Education context and tested with students of urban-related disciplines (architecture, urban planning, geography, etc.). The purpose was twofold: to improve the learning experience (developing students' knowledge and soft skills, and increasing their capacities to deal with complexity), and to test and promote new teaching approach-

[1] Source: European Environmental Agency, 2021 (https://www.eea.europa.eu/themes/sustainability-transitions/urban-environment, last consulted on 01/09/2022). See also: Eurostat (2016) *Urban Europe - Statistics on cities, towns and suburbs - 2016 edition*. Luxembourg: Publications office of the European Union, p. 38.

[2] Source: https://knowledge4policy.ec.europa.eu/foresight/topic/continuing-urbanisation/developments-and-forecasts-on-continuing-urbanisation_en (last consulted on 29/07/2022).

[3] Ibid.

[4] www.cityzen-smartcity.eu

es based on knowledge co-creation, international exchange and real-life applications. Therefore, CITYMINDED focused less on the urban sustainability agenda as a product, and more on the process leading to its definition, and on the learning environment where the process occurs.

On the other hand, the project inserted itself in the research on urban sustainability already conducted in the European academy in general and in partner universities in particular.

The partners of CITYMINDED already had a history of commitment in research and teaching on urban sustainability. Such commitment had already given way to collaboration in several Erasmus+ projects prior to the CITYMINDED experience. For instance, the 2015 projects E-RESPLAN (a Strategic Partnership including MIEMA, IRENA, and Universities "Pablo de Olavide" and Roma Tre as partners) and ENEPLAN (a Capacity Building project involving the Universities of Siena, Roma Tre and UPO, along with MIEMA) had already taken on the challenge to represent, manage and teach the complexity of decarbonisation through concept maps, by testing their educational use in energy planning within a multi-disciplinary partnership. Both projects had capitalized on the results of the Erasmus+ project EH-Cmap (funded in 2014 and participated by IRENA and MIEMA), which applied concept mapping to the energy refurbishment of heritage buildings.

At the same time, partners have continued exploring and developing the multi-disciplinary approach used in CITYMINDED, by promoting other Erasmus+ projects where such approach was broadened and applied to climate adaptation in cities. In 2020, for instance, University of Roma Tre, UPO and MIEMA have joined forces again in the project InCLIMATE - Integrating climate resilience in EU higher education, focusing on urban resilience to climate change.

The 'activism' of CITYMINDED partners on such matters is certainly not unprecedented in the European academy. In general, European Universities are widely involved in projects on urban sustainability, funded by the EU Commission under a variety of Programmes. Such involvement entails both inter-university collaboration and partnerships with non-academic organizations. However, at the time the proposal was developed, such projects were not as abundant as it may be expected, and urban sustainability in a climate change context was thus considered by the CITYMINDED consortium as a promising topic, especially if seen through the lens of academic teaching practice.

A rapid search of EU-funded projects in the whole 2014-2020 programming period reveals, indeed, that the urban sustainability topic, despite its declared relevance at EU level[5], has been quite underexploited in Programmes focusing on research and higher education.

This emerges, for instance, from a quick analysis of the proposals funded under the Erasmus+ Programme, and especially of the Strategic Partnerships for Higher Education, which entail inter-university collaboration for the development, transfer and/or implementation of innovative practices in higher education. On over 2900 funded projects, only 1% are explicitly dedicated to urban sustainability issues, such as sustainable energy, climate change adaptation, blue and green infrastructure, water and waste management, etc.[6]

Even fewer proposals focusing on such

[5] See for instance the Urban Agenda for the EU, launched in 2016 with the Pact of Amsterdam (https://futurium.ec.europa.eu/en/urban-agenda/library/pact-amsterdam).

[6] Source: project search database of the official website of the Erasmus+ Programme https://erasmus-plus.ec.europa.eu/projects/search (last consulted on 29/07/2022).

matters were funded in the same period by the Horizon2020 Programme, the most important EU Programme on research: only 11 (involving around 24 EU Universities), which can be considered as a negligible share of the hundreds of projects funded[7].

Urban sustainability has not been a much more successful topic in territorial cooperation programmes: less of the 4% of the total number of projects funded in 2014-2020 address urban sustainability topics, such as energy refurbishment, sustainable mobility and climate resilience[8]. Half of them have universities as partners, for a total of around 200 universities involved.

It is worth noticing that all these projects are largely focused on specific themes, perhaps lacking an overall reflection on the physical re-shaping of urban settlements and a comprehensive vision of urban planning and design oriented to sustainability.

It is therefore desirable that European universities, having engaged in diverse Programmes and established linkages with the non-academic world in the last programming period, capitalize these experiences and transfer them into academic practice and research, in order to innovate higher education on urban matters and pursue a collective multi-disciplinary reflection on urban sustainability, within the framework of the new EU Urban Agenda[9] and the New European Bauhaus[10].

The success of the CITYMINDED proposal could be considered as a promising indication that there are still margins to increase the incidence of urban sustainability issues (and of an integrated, more comprehensive approach to them) in EU-funded academic research and teaching, as well as in international, inter-university cooperation Programmes.

[7] Source: https://cordis.europa.eu/search (last consulted on 29/07/2022).
[8] Source: Keep database: https://keep.eu/ (last consulted on 29/07/2022).
[9] https://www.urban-agenda.eu/
[10] https://new-european-bauhaus.europa.eu/index_en


RALEIGH

1. Training on assessment and analysis of vulnerability associated with climate change

Jesús Vargas, Pilar Paneque, Josefina López, Amaranta Heredia, Universidad Pablo de Olavide

Abstract

In the face of the current climate emergency, mitigation actions must be combined with adaptation strategies to address the risks and impacts already being experienced. The risks arising from climate change differ from one place to another, as do the elements exposed and the capacities to cope with them. Vulnerability assessment and analysis tools are crucial to determine the exposed elements as well as the conditions of exposed elements that make them more susceptible to damage and the adaptive capacity of specific societies and systems. We propose a training methodology for vulnerability assessment and analysis to the effects of climate change through the calculation of a synthetic vulnerability index (VI) based on exposure, sensitivity, and adaptive capacity. This methodology allows a first approach to the multifaceted nature of risks, as well as to test different techniques, tools, and sources of information. The methodology has been applied in several case studies through different workshops with students (Siena, Rome, Seville, and Malta). Results show the feasibility of this methodology to be applied, in a flexible way, in the different case studies. It is concluded that the most accurate vulnerability analyses should be done at the local scale, however the availability of information sources at this scale is not sufficient.

On the left:
Richmond, Londra
Credits: Anna Laura Palazzo

Introduction

The main actions to address climate change relate to mitigation and adaptation. The CITYMINDED project methodology is oriented towards mitigation. However, as stated in the latest IPCC report (2022), the process of implementing mitigation and adaptation together brings not only a better understanding of this complex process but also to reach a sustainable development for all as climate resilient development (IPCC, 2022). Climate change forecasts predict an increase in the frequency and intensity of natural hazards in South Europe, among the most serious droughts, floods, and heat waves (IPPC, 2022). Therefore, along with the implementation of mitigation measures, with expected long-term results, it is urgent to implement adaptation measures to address the risks already posed by climate change. It is therefore essential in the learning process to also consider knowledge on methodologies aimed at strengthening adaptation to the effects of climate change that complement the knowledge acquired on mitigation. In this way, students can acquire a global and more complete vision of the possible strategies for action in the face of climate change. There is a general scientific consensus in considering risk as a dynamic process, resulting from the product of natural hazard and the vulnerability of exposed societies (European Environmental Agency (EEA, 2017, 2018); Intergovernmental Panel on Climate

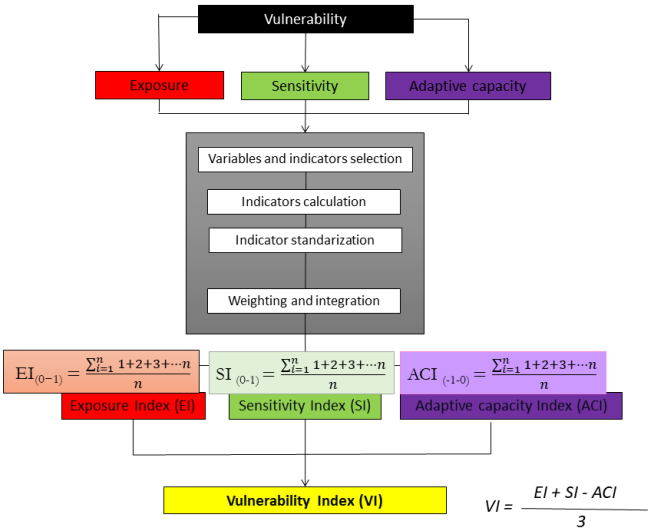

Figure 1 - Methodological framework

Change (IPCC, 2022; United Nation Office for Disaster Risk Reduction (UNISDR, 2015). The training methodology is based on the assessment of vulnerability which is defined as the susceptibility to be adversely affected by a natural or human-induced hazardous event. Vulnerability assessment and analysis have become one of the main tools for preventing and mitigating natural hazards effects on society, economy, and environment since knowing the causes that make us vulnerable is the basis for implementing corrective measures to achieve effective adaptation (UNISDR, 2015; EEA, 2018).

The main contribution aimed to introduce students in both theorical, and operational assessment and analysis of vulnerability associated with climate change. Training session specially focused on: 1) Bringing students closer to the hybrid nature of risks from climate change; 2) Introducing students to different research techniques, tools and data sources; 3) Training compound index calculation, representing, comparing and analysing results; 2) Setting up a method that allow students to understand the different components and dimensions of vulnerability; and 5) Highlighting the importance not only to measure vulnerability but also to analyse it (components and dimension of vulnerability).

Methodology

A specific learning methodology has been developed. Given the different backgrounds of the students, methodology and tools have been designed in a transversal and general way so that they can be approached by any student profile. The methodology and learning tools have been developed and adapted to the different case studies (Rome, Siena, Seville and Malta).

Each learning session in the different case studies has followed the same three-part structure: 1) Brief theoretical introduction on the usefulness of addressing vulnerability analysis in the

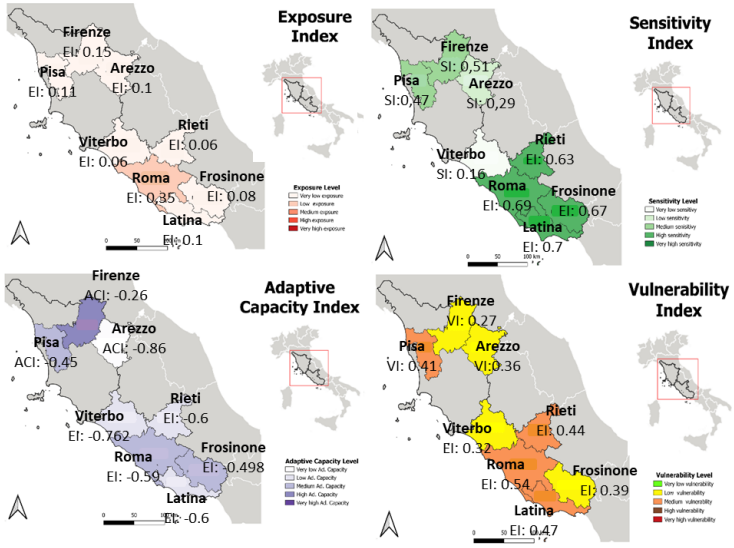

Figure 2 - Roma and Siena's workshops results

framework of adaptation and disaster risk reduction; 2) Students work with the tools provided by the teacher to assess vulnerability (Groups of 5-6 students where each group analyzes a case study), and 3; Presentation of results obtained and discussion on the usefulness of the methodology and tools used for group work.

The starting point of the learning methodology was the risk equation (Risk = hazard * Vulnerability). To assess vulnerability, we adopted the methodological framework proposed by Intergovernmental Panel on Climate Change (IPCC) (2012,2014) which defines vulnerability based on three main components: Exposure, Sensitivity, and Adaptive capacity. Figure 1 shows the methodological proposal to assess vulnerability.

The variables and indicators selected to characterise each of the three components have been adapted to the work scales used in each case and to the availability of data. A set of variables and indicators were previously selected based on two criteria: 1) availability of data; 2) that were diverse enough to capture the multidimensional nature of vulnerability (social, natural, economic, institutional, and technological) and that allowed students to train different tools and research techniques and data. To facilitate the process of calculating the indicators and the final assessment of vulnerability, each group was provided with two different tools.

1) A step-by-step document providing the variables and indicators selected, the justification for their use, their relationship with vulnerability, the sources from which to obtain the data and the necessary formulation for the calculation and standardisation of the results obtained. An example of this step-by-step document can be consulted here
2) A result excel sheet where students could enter the indicator results obtained and the composite

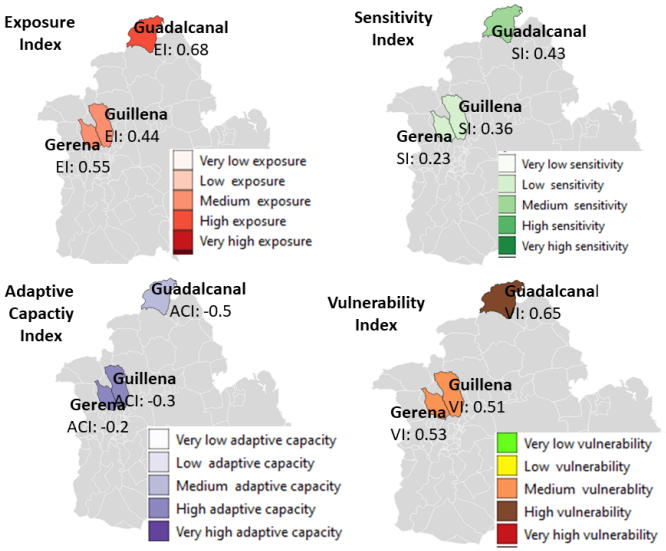

Figure 3 - Seville´s workshop results

indicators of exposure, sensitivity, adaptive capacity, and the final vulnerability index were automatically calculated. An example of result form can be consulted here

Once the indicators of each component were calculated we used the triangle structure of vulnerability (adapted from Liu *et al.* 2013) to analyse the contribution of each component to the final vulnerability value

Results

Figure 2 shows the results obtained for the Roma and Siena's workshop for the exposure, sensitivity, adaptive capacity and final vulnerability indices.

Figure 3 shows the results obtained for the Sevilla's workshop for the exposure, sensitivity, adaptive capacity, and final vulnerability indices.

Once we have calculated the Vulnerability Index, we can apply the data to the vulnerability structure triangle (Liu et al., 2013) not only to assess vulnerability but also to analyze causes of vulnerability in each study case. Figure 4 shows joint results for the vulnerability structure triangle.

Conclusions

After the application of the methodology in the different learning cases it can be concluded that this methodology has proved to be very useful and interesting to introduce students, with different background and interest, to the theoretical and practical approaches of risk assessment, and to the methodologies of vulnerability analysis and assessment. The exercise has been well adapted to the different scales of work (province in the Italian cases and municipalities in the Spanish and Maltese case) and could be adapted to other territorial realities. The main difficulty encountered is related to the availability of data in the appropriate form, updating and scales. Regarding the results obtained, the exercise has been useful to demonstrate and discuss with students the hybrid nature of risk

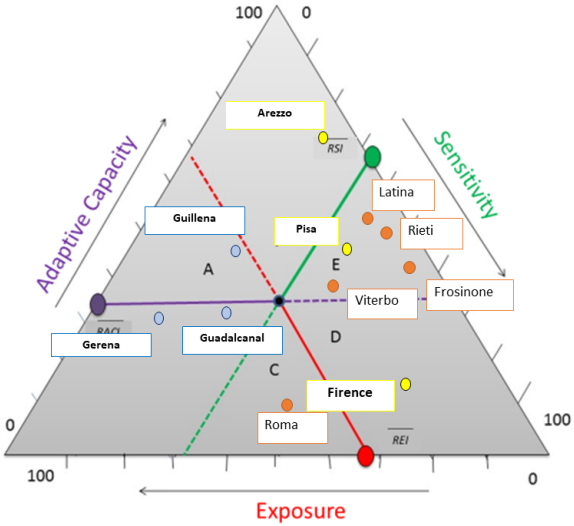

Figure 4 - Joint vulnerability structure triangle results

and the need to approach vulnerability studies from its multifaceted nature (social, environmental, institutional, economic, physical).

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BOX 1_Sevilla Norte

The North Municipal District is strongly characterised by the development of the infrastructures that surround it and that have crossed it during its history. The SE-30 Ring Road to the south, the Super North Ring Road and the railway network to the north, the Guadalquivir's Dock and, formerly, the railway to the west, and the Miraflores Park to the east. Large industrial areas and storage buildings, as well as the huge plot of the cemetery occupy the heart of the area, sharply separating the two large inhabited areas. This separation is increased by the high-speed traffic access roads to the city, leaving the neighbourhoods of San Jeronimo and La Bachillera isolated, as well as the settlement of El Vacie, which separates the North Ring Road from the rest of the neighbourhood at which it belongs.

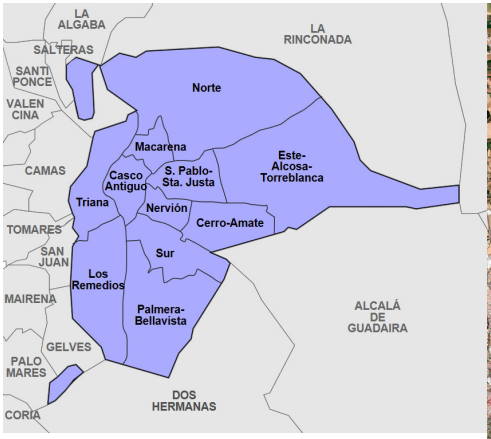
The SE-30 and Super North Ring Roads have greatly changed the neighbourhood's connections while at the same time establishing real physical barriers that are difficult to cross on foot or by means of non-mechanised transport.

The form of urbanisation in the case of San Jeronimo has been conditioned by the radial position of the main roads that have articulated it. It represents a very heterogeneous set of buildings, where the public space is constituted as residual, although it has one of the city's great urban parks, such as San Jeronimo Norte and, on the other side of the Dock, the Alamillo Park. There are therefore four types of housing in this area: a) Pseudo-rural typology, b) The expansion in a closed block (San Jeronimo in the 1950s), c) Isolated high-rise housing (La Papachina), and d) New developments in San Jeronimo in the 90s with a single-family semi-detached house, an isolated block and a closed block.

To the southwest of San Jeronimo there is the neighbourhood of La Bachillera that organises its growth between two of the historic roads leading out of the city towards La Vega (agricultural land). Emerging from a colonising process (occupation of disparate portions of agricultural land), it is surrounded to the north by an orchard and an electrical substation. It is a self-built neighbourhood with substandard housing characteristics and poor urban habitability conditions, which has generated a certain marginality among its inhabitants.

El Vacie is a slum settlement, the oldest in Europe, where around a hundred families live and which occupies the east side of the cemetery within the neighbourhood, on land planned for the expansion of the cemetery and part of the Soledad Becerril park, which has prevented the execution and use of the road that borders it, extension of the street, and its maintenance and use.

From top left to bottom:
Figure 1 - Seville's Neighbourhoods (North District). Source: Seville City Council
Figure 2 - Seville's aerial view. Source: European Space Agency
Figure 3 - Seville's San Jeronimo neighbourhood. Source: Mektres.


LA ALGABA
LA RINCONADA
SALTERAS
SANTI PONCE
VALEN CINA
Norte
Macarena
Este-Alcosa-Torreblanca
CAMAS
Casco Antiguo
S. Pablo-Sta. Justa
Triana
Nervión
Cerro-Amate
TOMARES
SAN JUAN
Sur
Los Remedios
MAIRENA
Palmera-Bellavista
ALCALÁ DE GUADAIRA
GELVES
PALO MARES
DOS HERMANAS
CORIA

2. Placemaking framework

Lorenzo Barbieri, Romina D'Ascanio, Francesca Paola Mondelli,
Università degli Studi Roma Tre

The introduction and concluding remarks are the result of a collective work. Lorenzo Barbieri worked on the paragraph *Town Planning*
Romina D'Ascanio worked on the paragraph *From ecological networks to green infrastructure to target ecological connectivity and communities' wellbeing*.
Francesca Paola Mondelli worked on the paragraph *Urban design as a tool for urban decarbonization: everyday landscapes and the city of proximity*

Abstract
This contribution seeks to convey the experience of four workshops carried out within the City Minded project, by explaining the scientific background and the teaching rationale and by making a comparison between the results of online and in-person workshops.
The placemaking framework places communities at its core and aims to look at a neighbourhood, a possible basic unit of a city, from a qualitative perspective. This approach was used in the context of the City Minded project under three perspectives: town planning, green infrastructure and urban design.
Even though the online workshops, forced by the Covid-19 restrictions on travel, gave good results, the comparison between them and in-person workshops allows to highlight the importance of actually living in a place, albeit temporarily, while studying it and designing solutions for it.

Introduction

Cities, neighbourhoods and towns are not only composed of brick and mortar, but also of people and relationships. This is why Roma Tre University's approach towards decarbonization has communities as its core. Any place can be shaped by its own community: the placemaking framework aims to look at a neighbourhood, a possible basic unit of a city, from a qualitative perspective.

On the left:
Torrino Mezzocammino, Roma
Credits: Anna Laura Palazzo

The so-called "Placemaking" refers to an integrated approach to planning and management of public spaces that exploit local knowledge and needs in order to improve the well-being and quality of life of communities (Schneekloth, 1995). Placemaking is a participative and collaborative process based on the enhancement of specific features of a place and the fulfilment of people's needs for the improvement of the public space and liveability. It is based on a long-term, future oriented process that recognises the uniqueness of a place. It involves listening to the people who live, work, visit, study and play in a place, to discover their needs and aspirations. It uses short and long-term interventions to build on the place's existing qualities.
Within this frame, the placemaking framework aims to provide students with the tools to analyse, read and understand a neighbourhood. The placemaking methodology has been addressed to define strategies for the improvement of the urban environment, and adaptation measures to climate change and decarbonisation to put in place, under the three perspectives of town planning, green infrastructure and urban design. Regulating the shape and functioning of a city can influence decarbonization: less distance traveled and less cars lead to less carbon in the atmosphere. The fight against climate change is also a factor, as aiming towards fewer greenhouse gases translates into a reduction of car-

bon dioxide, among others.
Three on-line workshop that involved the Universities of Siena (November 2020), Roma Tre (March 2021) and Pablo de Olavide (March 2022) allowed the research team to refine the teaching methods and contents. The final installment was the first in-person workshop, held in Valletta, Malta in July 2022, that confirmed the validity of the teaching contents.
This contribution seeks to reflect on the lessons learned during the last few years working on the City Minded project.
The focus of the paper will be the three topics mentioned above as the themes that were discussed in the workshops. The topics are in fact all interconnected with respect to decarbonization because they all contribute to that end.

Town planning

Town planning regards, very broadly, all things related to the development and management of a portion of land: be that a city, a town, a group of fields or a national park. From the point of view of the everyday life of a resident, town planning translates into one or more sets of rules: what can or cannot be built in a specific location; the land use and regulations of an area; the path a new road will have.
There is an amusing example of what constitutes a bad example of town planning in action, of what it should not be. The popular series The Hitchhiker's Guide to the Galaxy – known as a radio programme, a tv-series, a series of books, and a movie – opens with the story of Arthur Dent. An ordinary Englishman, he is lying between his home and a bulldozer: he recently found out that his house is to be demolished to make room for a new road, a bypass! A man from the local council, Mr. Prosser, tries to convince him to leave his position. Dent argues that he does not understand why the bypass must be built. "You've got to build bypasses" (Adams, 1979, p. 11) answers Prosser, who adds that Dent had plenty of time to object:

> 'But the plans were on display…'
> 'On display? I eventually had to go down to the cellar to find them.'
> 'That's the display department.'
> 'With a torch.'
> 'Ah, well the lights had probably gone.'
> 'So had the stairs.'
> 'But look, you found the notice didn't you?'
> 'Yes,' said Arthur, 'yes I did. It was on display in the bottom of a locked filing cabinet stuck in a disused lavatory with a sign on the door saying *Beware of the Leopard*.' (Adams, 1979, p. 12)

This excerpt highlights the failings of town planning, what it should not be: a set of rules that are perceived as distant from the general public. What Mr. Prosser described as public display is nothing of the sort: the plans are hidden away and not readily available to those who are affected by them. Of course this is all fiction, but it is used in this context as an example of how town planning is perceived. A short video of this scene was shown to students in the City Minded workshops.
Town planning is a place-based activity: although there are general rules that apply in all places (such as the need for a minimum distance between buildings or the need of basic services in an area), many decisions must be founded on the area they will affect. For instance, in Italy 19 regional and 2

provincial laws regulate the planning system, so that the way in which plans are developed differs between Florence and Verona.
This is why each lecture on the topic has been tailored to the appropriate context. Even within a broader lecture, there is the need to show some examples of how planning is applied in an area. This was carried out through a brief overview of the planning system of the country and the regional and local plans in the area.
An important part of the territorial analysis of an area is the site visit. Due to the Covid-19 restrictions this was not possible in the first three workshops. Nevertheless, the students were able to explore the areas through the internet: satellite maps, street views, local news articles and knowledge, were some of the sources they used.
The workshop held in Malta, in the summer of 2022, allowed the students to explore the city both during a site visit and while walking around during the five days of the workshop. This allowed for a better understanding of the area in Valletta. Students were able to directly experience the local environment, not just to look at pictures of an area.

From ecological networks to green infrastructure to target ecological connectivity and communities' wellbeing

In 1992, as part of the implementation of the Convention on Biodiversity (UN, 1992), the European Community extended protection to endangered plants and non-bird species, already protected thanks to the Bid Directive (1979), through the Habitats Directive (1992). The Directive introduces the concept of ecological network, precisely the NATURA 2000 Network, made up of Sites of Community Interest (SCI)/Special Areas of Conservation (SAC), Special Protection Areas (SPA) and landscape elements that act as a connection for flora and the fauna (rivers, hedges, wooded areas, residual natural and semi-natural areas) and which connect the Natura 2000 Sites to each other. Following the ecological perspective, the ecological network can be defined as an interconnected system of habitats whose biodiversity needs to be safeguarded. Thus, the focus is on animal and plant species that are potentially threatened. The geometry of the network has a structure based on different components: core areas which are areas of high-quality habitats that are managed primarily for biodiversity conservation, whether or not they are protected; (ii) buffer zones which are transitional areas, located around highly natural areas where restrictions on resource use and special development measures are undertaken in order to enhance the conservation value of the protected area; (iii) ecological corridors which are linear and continuous structures in the landscape connecting highly natural areas to each other and representing the key element of ecological networks since they allow for species mobility and genetic exchange and (iv) stepping stones that are smaller areas of quality habitats that are intended to help the movement of individuals by serving as islands of favorable habitats between larger core nature areas (Kleyer et al., 1996; Battisti, 2003, Magaudda et al., 2020). The Ecological Network (EN) aims to mitigate habitat fragmentation and ensure the permanence of the ecosystem processes and the connectivity for sensitive species. In 1999, through the elaboration of

Figure 1 - Example of constructed wetland in Lyon along the Saône River, France. Photo credit Romina D'Ascanio (June 2018)

the European Spatial Development Perspective (ESDP) programmatic document about, the ecological network was identified as a priority tool to strengthen the policies for the protection and enhancement of the European natural and ecological heritage. In fact, in the following years a translation of the concept of ecological network in the practice of planning happened.
Many planning tools have incorporated the ecological network in both land use planning and regulatory terms.
For example, the Ecological Network of the Rome General Plan (2008) identifies the primary, secondary and completion components according to the sensitivity and quality of the ecosystems included, within a structured environmental system. However, despite the innovativeness of these principles, the implementation of the ecological network of the Plan did not take place and this represents a strong critical point in the ecological transition and in the management of green spaces in Rome (Modigliani & D'Ascanio, 2022).
Undoubtedly, the French experience of the "Trame verte et bleu" represents good practice not only from the normative point of view but also from the spatial planning point of view. The "Trame verte et bleu" is a network of the land and water ecological continuities identified by the Schéma Régional de Cohérence Ecologique (SRCE) and planning documents produced by the French government, local authorities and groups of authorities. This network contributes to improving the conservation status of natural habitats and species and achieving the good ecological status for water bodies.
The EN concept has evolved over the years into the more comprehensive Green Infrastructure framework (Benedict & McMahon, 2002; Benedict & McMahon,2006; EC, 2011). If the EN follows a mainly biological and ecological approach, green infrastructure represents an innovative way in which the benefits to communities produced

by nature are taken into account in spatial planning (Gr dinaru & Hersperger, 2019).
In Europe, Green Infrastructure (GI) was introduced by Target 2 of the European Biodiversity Strategy (EC, 2011) and the European Green Infrastructure Strategy (EC, 2013). The latter defines GI as a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services (EC, 2013).
The concept of EN has evolved over the years into a part of the current model of GI according to which the same area of land can frequently offer multiple benefits if its ecosystems are in a healthy state. For this reason, the literature attributes to GI the characters of multiscalarity and multifunctionality (Davies et al., 2006; Hansen & Pauleit, 2014). The Green Infrastructure approach analyses the natural environment in a way that highlights its function and subsequently seeks to put in place, through regulatory or planning policy, mechanisms that safeguard critical natural areas. Green infrastructure has the potential to tackle several problems simultaneously in alternative to traditional grey infrastructure (Andreucci, 2017).
Furthermore, the French "Trame verte et bleu" strategy is considered not only a good practice of ecological network planning but also a strategy able to take GI into spatial planning, since it was subsequently enriched by reaching objectives of improving the well-being of the quality of life of the communities and of collaboration between economic and agricultural sectors for the achievement of environmental sustainability and the protection of nature. It is a national spatial planning tool aimed at stopping the decline of biodiversity by conserving and restoring ecological continuities to ensure provision of ecosystem services (Clergeau & Blanc, 2013).
On a design and spatial level, green infrastructure can be declined as green roofs, gardens, green walls, rain gardens, urban and peri-urban parks, large protected areas, river parks, constructed wetlands, tree-lined avenues (Fig. 1). With climate change and the need to decarbonise our cities and territories, green infrastructure interventions are strongly recommended, for example, for lowering heat island temperatures in cities or mitigating the impacts of pollution or sheltering pollinators and other animal species or enriching urban biodiversity. Therefore, having functional and quality green areas provides good solutions both for nature and for the well-being of the people living in our cities and territories. Indeed, the new European Biodiversity Strategy (EC, 2020) promotes healthy ecosystems, green infrastructure and nature-based solutions to be integrated into urban planning, including in public spaces, infrastructure and the design of buildings and their surroundings.
Based on this theoretical and methodological approach to city design and planning aimed at greening and ecological transition through green infrastructure, during the three online workshops and the intensive in-person course, students were given the opportunity to imagine, after careful needs analyses, how green infrastructure could improve the contexts we were working on.
The main objective was to first identify all points of discontinuity in ecological corridors and degraded open areas and then work on possible improvements

Figure 2 - Garden roof of the Valletta Design Cluster in Malta. Photo credit Romina D'Ascanio (July 2022).

through the implementation of green infrastructure to improve open space. Considering the background of the students and the study areas of the various workshops, the results were multiple and showed relevant and growing sensitivity of all students to the issue of quality green spaces both for their function of conservation of ecosystems in urban and peri-urban areas and for the improving function of the values of the landscape, the natural heritage and the possibilities linked to leisure.
The workshops revealed that our cities still have a long way to go in the ecological transition and implementation of green infrastructure. Surely from the point of view of the planning of specific interventions it was possible to verify that some interesting experiences are already in place such as the garden roof of the Valletta Design Cluster in Malta (Fig.2)or the system of widespread parks in the Torrino Mezzocammino district in Rome. However, from the planning point of view, there are still delays not only in the implementation of ecological networks but in the planning of the green infrastructure.
In the workshops held online, the students did not have the opportunity to live in person and physically move in the spaces of the study areas, therefore their experiences and their points of view were filtered more by the desk presentations and those of the stakeholders. The experience of Malta was positive not only because the students were able to carry out several inspections but because it took place in July, during which very high temperatures were recorded in the city. This allowed the students to understand how in the few green areas available, in a densely urbanized city like Valletta, temperatures were lower and people found relief. They were therefore able to develop more aware and structured strategies and had the opportunity to locate urban greening interventions in a more targeted manner.

Urban design as a tool for urban decarbonization: everyday landscapes and the city of proximity

At the end of an era when open space was synonymous with infrastructure, cities have entered the 21st century seeking to recover a more human and sociable dimension that embodies the concept of everyday life and proximity. Neighborhood public space emerges as an essential feature to guarantee the *right to the city*, expressed, in a material sense, through the accessibility and immediate use by the inhabitants. This leads many investigations and experiments towards places and relations of local scale, balancing the urban and metropolitan centrality approach that has characterized urban planning in several European cities.

If in the past the idea of landscape was limited to a concept of beauty and uniqueness, with the European Landscape Convention in 2000, the definition of landscape has been extended far beyond the idea of outstanding, including, in the article 2, all those landscapes such as the everyday or degraded ones. During the quarantine, following the spread of Covid-19 (march 2020), while the within walking distance has been reduced to 200 m from home, the consequences of poor urban quality have been accentuated in those neighborhoods where public space is lacking. For this reason, it became even more clear the need to invert the design perspective: it is not the citizen who has to reach the center, the services or the social spaces, but it is the urban design that must come closer to the inhabitants, offering possibilities, becoming more democratic. So, during the CityMinded workshops, the use of these everyday landscapes has been encouraged as a form of contrast to the use of the car in order to support urban de-carbonization. Since the pandemic has forced us to experience proximity life, the research took the opportunity to reflect on what can be achieved by working at the neighborhood scale. Therefore, the challenge of proximity has become even more central and very relevant theme in urban design.

In recent years, new stresses have pushed cities to deal with public space and local scale: among them, the now perceptible climate change and the most recent pandemic crisis, call for accelerating the long-awaited shift from the "city of the car" to the "city of proximity" (Spada, 2021). The contemporary model in this regard is that of the "15-minute city," pioneered by an increasing number of cities around the world, with actions always oriented toward polycentrism and the empowerment of local realities as autonomous as possible, so as to facilitate daily life and reduce travel.

The city that has most worked out and applied this theory, at the moment, is Paris. The mayor of Paris Anne Hidalgo is carrying out the project of the "quarter-hour city", supported by the theories and studies of Prof. Carlos Moreno, Sorbonne Pantheon University. The transformation of the spaces of proximity takes place, in this model, through a tactical approach. Moreno said that «The 15-minute city represents the possibility of a decentralized city. At its heart is the concept of mixing urban social functions to create a vibrant vicinity» (Moreno, 2021).

In the 15-minute city, all essential services and facilities that enable a good level of urban quality of life are reachable by every inhabitant within a maximum

time of 15 minutes from home. A concept, therefore, that transmutes distance to a temporal dimension, in the view of so-called chrono-urbanism. This idea argues that the level of urban quality of life is inversely proportional to the amount of time invested in travel, especially by car. In fact, the 15-minute concept presented by Professor Carlos Moreno was worked out primarily to reduce urban carbon emissions.
Hence there is an increase in public health, which benefits from a lifestyle that encourages walking and more time for leisure and sports. Adding to the health topic, there are the benefits of improved air quality that results from reduced carbon emissions. The well-being of the individual, then, is accompanied by an environmental well-being that goes to constitute benefit for the whole community.
In Paris, Anne Hidalgo has inaugurated the "ecological transformation of the city" (Reid, 2020), intervening in open space so as to take space away from cars and give it back to the inhabitants. Therefore, interventions to transform public spaces at the neighborhood level are proposed, searching existing spaces, whether covered or uncovered, for new possibilities to implement the system of green areas in the city, also with a view to mitigating the effects of climate change.
However, talking about 15 minutes city means to pay special attention to urban density. That's because there is a major morphological difference between the ancient city, built before the car came along, and the modern city, i.e., the suburbs that have sprung up and grown since the 1960s, structured by "infrastructure space" rather than "relationship space." in these contexts, the challenge is far greater, since it is necessary to make "proximate" in use something that is "distant" concerning the scale of its spaces, just as it was for Mezzocammino district in Rome or in Ravacciano district in Siena or in Seville Nuevo Northe, in the third Cityminded workshop.
Unlike the first three workshops, the last one, in Valletta, represented the opportunity to take advantage by the compact morphology typical of the historic center, which could help us to build a proximity neighborhood and social life. In fact, Proximity is not always a travel time issue, rather a design topic: shape an urban form that encourages pedestrian mobility, in order to build a carbon neutral city.
In the case of La Valletta, its urban morphology and small size were perfect for pedestrian use of the streets. The most important thing, in this case, was precisely to be able to balance this density by recovering public spaces as much as possible, also to allow the creation of small green areas, which would help to fight heat islands. The exercise proposed during the co-working sessions, therefore, allowed us to reflect on different urban morphologies by looking each time for creative ways to apply this model of proximity: relieving traffic, creating a new hierarchy of streets, and imagining small design interventions (also through tactical urbanism), in the open spaces that are recovered.

Final considerations

The placemaking framework proved to be a valuable tool to teach students a qualitative approach to urban analysis and planning that was integrated with green infrastructure and urban design. The lectures combined both a theoretical approach to the topic and a place-specific approach to the study area,

which allowed the teachers to provide a context in which they could apply what was previously explained. This also allowed students to better understand the context they were going to work on.

While during the on-line workshops the students could understand the concepts explained in the lectures and apply this knowledge in local contexts, it was only in the in-person workshop in Valletta that they could actually appreciate the value of actually experiencing how it is to live in the place they would plan for.

Only by being in Valletta during summer could they realise the importance of green infrastructure in mitigating the heat. Moreover, walking around the city centre also familiarised them with the requirements of pedestrian and with the crucial importance of designing a 15-minute city. Finally, actually interviewing local residents allowed them to understand what their needs were directly rather than from a news article. Bernardo Secchi once said that planning is done on one's feet (*l'urbanistica si fa con i piedi*) and this could not ring more true to the students of the City Minded workshops!

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BOX 2_Torrino Mezzocammino, Rome

Torrino Mezzocammino lies just outside Rome's ring road, known as Grande Raccordo Anulare (GRA) in the south of the capital. Torrino (small tower) is a historical place name originating from a nearby neighbourhood, while Mezzocammino literally means halfway, because it is located in the middle of the route between the city centre and the port of Ostia. A small pier for the overnight stop of commercial boats was located on the river in the vicinities of the neighbourhood.

Ever since the 1930s the area was supposed to be developed as a residential area, but it was not until the late 1990s that a consortium among the many landowners was established, allowing the preparation of a development plan for the area. The first inhabitants moved in in 2008, with most works still ongoing, both on the public amenities and on the houses. As of October 2022 some areas are still being developed.

The neighbourhood features a rectangle of roads at its centre, enclosing a large open space, still awaiting to be developed into an urban park. Other parks are already open and feature benches, open-air gym equipment, playgrounds, and even the remnants of an ancient Roman road. One of the corners of the rectangle is a roundabout placed below the ground level. The walls of the roundabout feature the pictures of famous Italian comic book characters, as reflected by the street names of the neighbourhood, honoring comic book writers and designers. On top of the roundabout is a cluster of supermarkets, shops and restaurants in a pedestrian area. Other shops and amenities are located on the other main roads.

Torrino Mezzocammino is well connected to the surrounding road system: apart from the ring road, via Ostiense/del Mare and via Cristoforo Colombo on the west and east side respectively, connect it to the city centre and to the seaside. What lacks is a public transport connection: despite being bordered by the metro-like Roma-Lido railway, the neighbourhood has no station, nor it is expected to be built in the near future. Bicycle paths cross all parks and footpaths are large and well maintained, so the inhabitants can easily move around the neighbourhood in a sustainable way. The only setbacks are the long distances and the lack of a connection to the river Tiber and the cycle path that runs along it.

Nevertheless Torrino Mezzocammino is full of promise: good maintenance of the parks and amenities, and better public transport and cycle connections can make it a good standard for future neighbourhoods.

Figure 1 - Piazza Andrea Pazienza, the below ground roundabout honouring comic book writers
Figure 2 - One of Torrino Mezzocammino urban parks
Credits: Anna Laura Palazzo


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3. Carbon Accounting of urban areas and Carbon Footprint mitigation measures

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Abstract

The Carbon Accounting Methodology proposed by the University of Siena in the City-Minded Workshops is based on a framework that offers the opportunity to modelling the effects of different environmental solutions to mitigate the current Carbon Footprint of an urban system at different scales (i.e., neighborhood, household, and person). The framework is inspired by the Intergovernmental Panel on Climate Change standard methodology for Greenhouse Gas emissions inventory of Nations and the assessment approach proposed in the EU FP7 City-Zen Project, which combine new technologies and citizens' behavior. This framework allows to both assess the Carbon Footprint of urban areas and to estimate the effects, in terms of Carbon Footprint mitigation, of a series of actions with the goal to reach the Carbon Neutrality. The Workshops have been divided into lessons and co-working sessions, carried out in presence or online (considering the pandemic COVID-19 restrictions). In the case of a face-to-face experience, teachers, students, and stakeholders have the opportunity to carry out the site visit of the studied urban area, conducting interviews with citizens and experimenting with the effects of a greater variety of strategies, not limiting them only to the production of electricity from renewable resources (as in the case of the online workshop). To better understand the methodological framework, the case study of the online Workshop conducted in Seville (Spain) was presented. The developed approach offers the opportunity to provide an integrated vision of the city of the future.

1. Introduction

The growing attention paid to anthropogenic greenhouse effect is leading Nations and International Organizations to pursue common goals to limit the inevitable climatic impacts that the Planet is already experiencing and will increase in the coming years. The 195 States that signed the Paris Agreement in 2015 have set a common goal to limit global warming well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C, recognizing that this would significantly reduce the risks and impacts of climate change (UN, 2015). The European Union, following its commitment to global climate action, has set itself the goal of becoming climate neutral (i.e., a Country with net-zero greenhouse gas (GHG) emissions) by 2050 (EU, 2022). This ambitious goal is the cornerstone of the "European Green Deal" and, to achieve it, it has set the intermediate target of a net domestic reduction of at least 55% in GHG emissions by 2030 compared to 1990 levels (EC, 2021). The long-term strategy of the European Commission has identified cities as strategic points and ideal laboratories for the

On the left:
Square Leon Serpollet, Parigi
Credits: Anna Laura Palazzo

study and application of transformative and sustainable solutions (EC, 2018). A new city planning system can be the main driver to achieve net GHG emissions by 2050. The *City Minded* Project and the Methodology developed and tested during its City Decarbonization Itinerant Workshops fit perfectly into the objectives of the GHG emissions reduction, set by Europe. For this reason, it represents a valid tool for the climate impact assessment in the urban contexts, suggesting also specific environmental policies for the improvement of inhabited areas.

The Carbon Accounting Methodology proposed in the Project's City Minded Workshops is based on a framework that offers both the opportunity to quantify the current GHG emissions (or Carbon Footprint) of urban systems at different scales (i.e., city, neighborhood, household, and single person) and to estimate the effects, in terms of Carbon Footprint mitigation, of a series of actions with the goal to reach the Carbon Neutral condition. The City Minded Workshops have been divided into training and co-working sessions, carried out in presence or online (considering the pandemic COVID-19 restrictions), creating a learning approach based on both theoretical and practical skills. In the case of a face-to-face experience, teachers, students, and stakeholders could carry out the site visit of the studied urban area, conducting interviews with citizens, activities that cannot be done if the workshop take place online. To better understand the methodological framework, the case study of the online Workshop conducted in Seville (Spain) was presented. The developed approach offers the opportunity to provide an integrated vision of the city of the future.

2. Material and methods

The training session consisted in two presentations:

1) An overall description of the Carbon Accounting Methodology developed and applied during the City Minded Workshops, with a brief historical report of the working path that led to this framework. The developed framework was inspired by the Intergovernmental Panel on Climate Change (IPCC) Guidelines for GHG emissions inventories of Nations (IPCC, 2006; 2019), and the advances carried out by the Ecodynamics Group of the University of Siena (Italy) in much scientific research (Bastianoni et al., 2014; Maccanti et al., 2017; Marchi et al., 2012; 2017; 2018), including that of the EU FP7 CityZen Project (Pulselli et al., 2018, 2019, 2020, 2021);
2) A detailed explanation of the exercise that students had to carry out (in the provided Excel file) during the co-working session. The purpose of the exercise was the estimation of the current Carbon Footprint (CF) of the study area (in this case the Municipality of Seville), the related Virtual Equivalent Forest surface (i.e., the forest area needed to remove from the atmosphere the GHG emissions due to the human activities performed within the analyzed territorial boundaries) and the mitigation measures toward Carbon Neutrality, paying particular attention to energy production from renewable resources.

Students were divided into 2 virtual working classrooms, and they had about 2 hours to develop the exercise,

Emission sectors	Impact sub-categories
1) Energy	✓Transport ✓Heating for residential and tertiary sectors ✓Energy production in industry ✓Electricity production and consumption
2) Waste	✓Landfill ✓Anaerobic digestion ✓Wastewater treatment plants
3) Agriculture, Forestry and Other Land Uses (AFOLU)	✓Green areas uptake ✓Food consumption

Figure 1 - Emission sectors and impact sub-categories of the Municipality of Seville.

discussing among themselves.
The CF of the Municipality of Seville was inventoried, considering the emission sectors of origin, divided into impact sub-categories (Figure 1). The impact sub-categories, analyzed in the study, were the energy use (e.g., electricity, natural gas and other fuels used for lighting, appliances, cooling, heating, domestic water heating, and cooking), mobility (concerning all the fuels used for public and private vehicles), waste management, water consumption and eating habits. For the latter, three types of diet were considered: a diet with medium-high consumption of animal protein, a balanced diet, and a balanced diet with purchase of local food.
The accounting methodology considered carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions, converted in CO_2 equivalent (CO_2eq) applying the respective 100-year Global Warming Potential (GWP). Thus, a CO_2eq is a metric measure used to compare all GHG emissions other than CO_2 to their equivalent amount of carbon dioxide, on the base of their GWP values (IPCC, 2021).
GHG emissions were calculated, applying the following basic Equations (Eq. 1 and Eq. 2), proposed by the IPCC Guidelines (IPCC, 2006; 2019):

$$CF_i = AD_i x\, EF_i \quad \text{(Eq. 1)}$$

$$CF_{TOT} = \sum_{i=1}^{n} CF_i \quad \textit{(Eq. 2)}$$

where:
$\boldsymbol{CF_i}$ = the carbon dioxide equivalent emissions in one year (kg CO_2eq);
$\boldsymbol{AD_i}$ = the activity data (e.g., tons of gasoline consumed for transport);
$\boldsymbol{EF_i}$ = the specific emission factors per unit of activity (e.g., kg CO_2eq/t gasoline for transport).

The assessment methodology associated a specific emission factor (EF_i) to each human activity (AD_i).
The Virtual Equivalent Forest surface, needed to absorb the GHG emissions

from each human action, was quantified by the production between the CF of a specific activity and a conversion factor, that in average is equal to 1.3 kg of CO_2/m^2 of forestland. The sum of all Equivalent Forest surfaces provided the overall green area able to remove from the atmosphere all the GHG emissions of the analyzed territorial district (Pulselli et al., 2019).

Lastly, students were invited to simulate the CF mitigation through the implementation of some environmental policies, considering the consumption savings, the policy penetration rate in the population and the electricity production yield from renewable resources. In particular, the GHG emissions reduction was developed, hypothesizing the installation of new devices (i.e., photovoltaic (PV) panels and wind turbines). Moreover, the location in which these technologies could be installed, and the potential electricity production have been identified. A series of actions concerning different spatial (from the household to the whole city) and time scales of implementation (short-, medium-, and long-term mitigation measures, which can be applied in 10-20-30 years) was performed. The Virtual Equivalent Forest surface was "crunched", because of the hypothesized decarbonization plan, using the Pac-Man Game as a visual tool.

3. Results and Discussion

The CF of the Municipality of Seville (3,371,865 t CO_2eq) was reported in Table 1, indicating that the protein diet had the greater impact (39.6%) on the total, followed by mobility (26.2%) and the fossil fuels used for the industrial sector (9.8%). The electricity consumption covered 9.6% of the overall emissions with a relevant contribution played by the residential activities (3.9%). The waste management contributed to 7.0% of the total GHG emissions, considering the low percentage of recycling and the massive waste disposal in landfills.

The current CO_2 uptake was indicated with a negative (-) sign because it represented the removal of this GHG from the atmosphere due to the local ecosystems. It showed a very low value (-2,596 t CO_2eq), determining a percentage abatement of the total emissions equal to 0.1%.

Figure 2 - Virtual Equivalent Forest surface of the Municipality of Seville (in yellow).

In the next page
Figure 3 - Carbon Footprint (CF) mitigation of Seville Municipality.

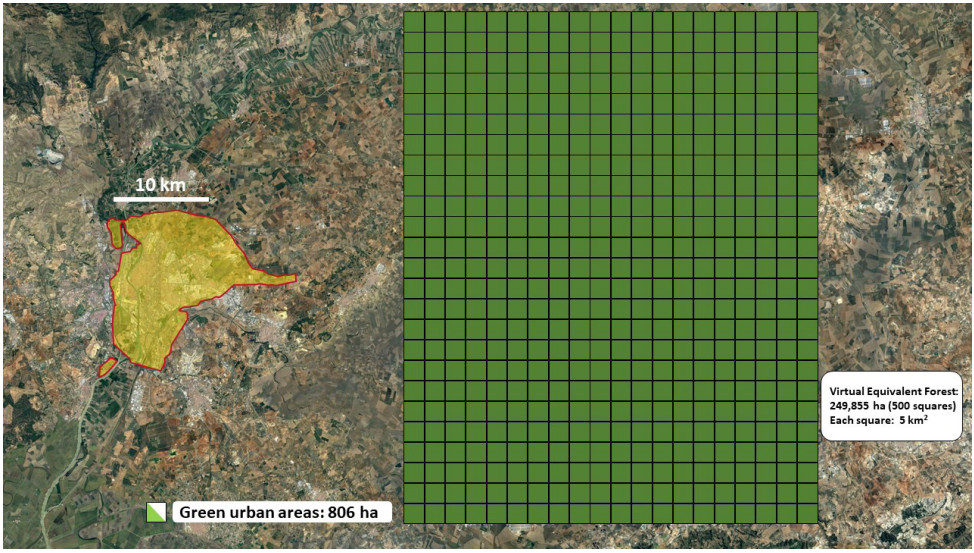
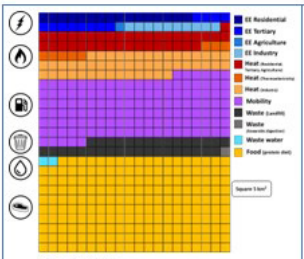


Table 1: Carbon Footprint (CF) of the Seville Municipality.

Activity sector	CF	Percentage of the total
	t CO2eq	%
1) ELECTRICITY CONSUMPTION	**322,095**	**9.6%**
Industrial sector	83,047	2.5%
Residential sector	131,135	3.9%
Transport	3,171	0.1%
Tertiary sector	93,409	2.8%
Agriculture sector	11,332	0.3%
2) FUEL CONSUMPTION	**584,903**	**17.3%**
Industrial sector	329,175	9.8%
Residential sector	93,504	2.8%
Tertiary sector	22,863	0.7%
Agriculture sector	139,360	4.1%
3) MOBILITY	**882,402**	**26.2%**
4) WASTE	**234,668**	**7.0%**
5) WATER	**11,592**	**0.3%**
6) FOOD (protein diet)	**1,336,203**	**39.6%**
TOTAL EMISSIONS (sum 1+2+3+4+5+6)	**3,371,862**	**100.0%**
ACTUAL UPTAKE	**-2,596**	**0.1%**



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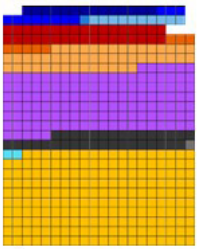

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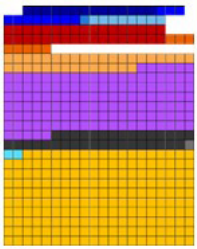

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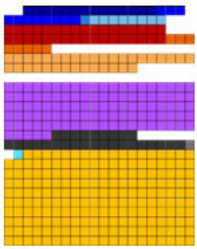
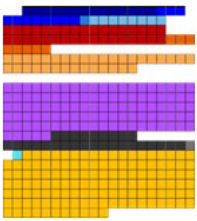


3)

LIST OF IMPLEMENTED ENVIRONMENTAL POLICIES:

1) Reduction of energy consumption (led lamps and more efficient appliances);
2) Life Cycle Assessment and circular economy in industrial sector;
3) Increased use of bicycles and less waste production and water consumtion;
4) Balanced diet;
5) Nature-based solutions and thermal insulation;
6) Smart working and car pooling;
7) Less water supply losses;
8) Local food;
9) PV panels (South exposed roofs);
10) Increase in waste recycling and increase in anaerobic digestion of organic fraction;
11) Wind turbines;
12) Public transport;
13) Heat pumps and electric mobility;
14) Other PV panels and wind turbines;
15) Uptake



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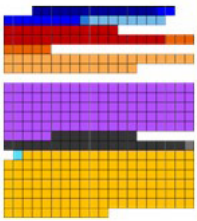

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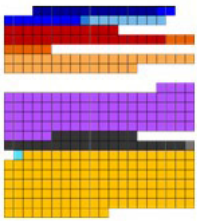

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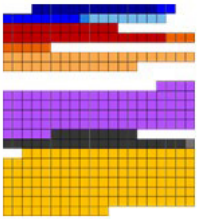

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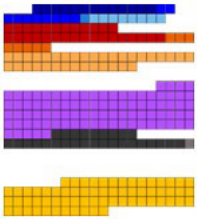

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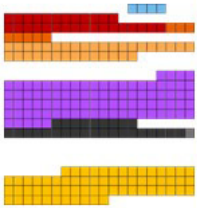

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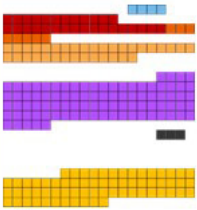

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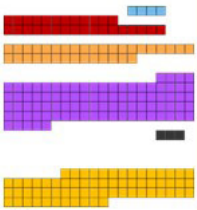

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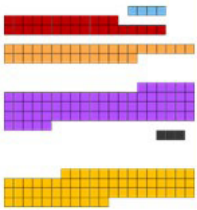

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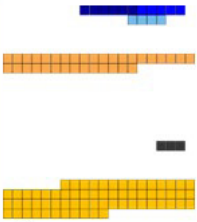

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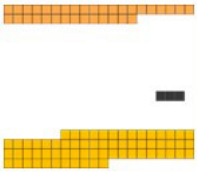

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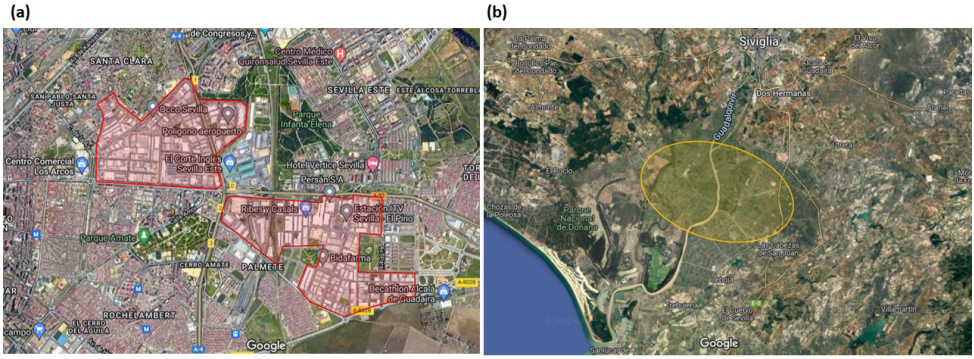

Figure 4 - Potential location of PV panels (a) [red boxes] and wind turbines (b) [yellow shape].

The Virtual Equivalent Forest surface of the Municipality of Seville was 249,855 ha, represented by 500 green squares of 5 km² each one (Figure 2). The actual green urban area (i.e., parks, gardens, and lawns) was only 806 ha, therefore, 94% smaller than the Virtual one.

The Current status, reported in Figure 3, showed that 198 squares of Virtual Equivalent Forest were needed to remove emissions from a high protein diet, 131 squares for the mobility, 49 for the fuel consumption in industrial activities and so on.

Figure 3, also, shows the CF mitigation, illustrating the implementation of 15 environmental policy in a decarbonization path. It was important to remember that to achieve ambitious results, such as Carbon Neutrality, a wide variety of measures had to be implemented. Among these, the electricity production from renewable resources (i.e., PV panels and wind turbines) and the transition to electrified devices for transportation and buildings heating demonstrated the highest emissions reduction.

During the exercise students identified in the Google Maps platform the surfaces available to install other PV panels, as well as the location and the number of new wind turbines that could be introduced in the municipal jurisdiction (Figure 4).

The installation of about 290 ha of PV panels on the buildings and warehouses roofs in the industrial area was simulated, suggesting an annual electricity production of 580 GWh, mitigating the CF due to the electricity consumption of 33% and that of the overall Municipality of 5%.

Moreover, the installation of about 42 wind turbines (3 MW each one) was hypothesized in the area near the Guadalquivir River, characterized by cropland, grassland, and vacant lots just outside the boundaries of the municipality. Inside the municipal area the installation of wind turbines was impossible because of the densely inhabited and built landscape. These turbines would be able to produce 294 GWh of electricity each year, mitigating the CF due to the electricity consumption of 17% and that of the overall Municipality of 7%.

4. Conclusion

The main objective of the Carbon Accounting Methodology was to develop and test an innovative and creative

learning approach in which students, specialists and stakeholders could collaborate to identify and design the best solutions for decarbonizing cities. Specifically, the methodology focused on the development of an innovative urban landscape planning able to address site-specific challenges and to provide roadmaps toward carbon neutral cities. A tool such as the one presented in this paper shows how it is possible and relatively simple to carry out a preliminary study (which presents, of course, many assumptions) able to give an immediate idea of the greenhouse gas emissions amount for which a given urban area is responsible. This, in the first analysis, can be a valid starting point for putting in place preliminary reasoning for the redevelopment and optimization of an urban area in a medium- to long-term perspective in which to achieve carbon neutrality.

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Box_3_Ravacciano, Siena

Ravacciano is a residential neighborhood of the city of Siena (central Italy), and it hosts 1631 inhabitants, with an average density of 35.6 people/ha. The first settlement has been built during the '30s, in the years of the fascist regime. Then the built area has grown until the '70s and '80s. The valleys of Follonica and Ravacciano, separated by the medieval wall, connect the old city to the Ravacciano neighborhood and the productive and commercial district down the hill. These valleys are partially accessible to people and are fractioned into several private properties, besides a few areas with public ownership (Figure 1).

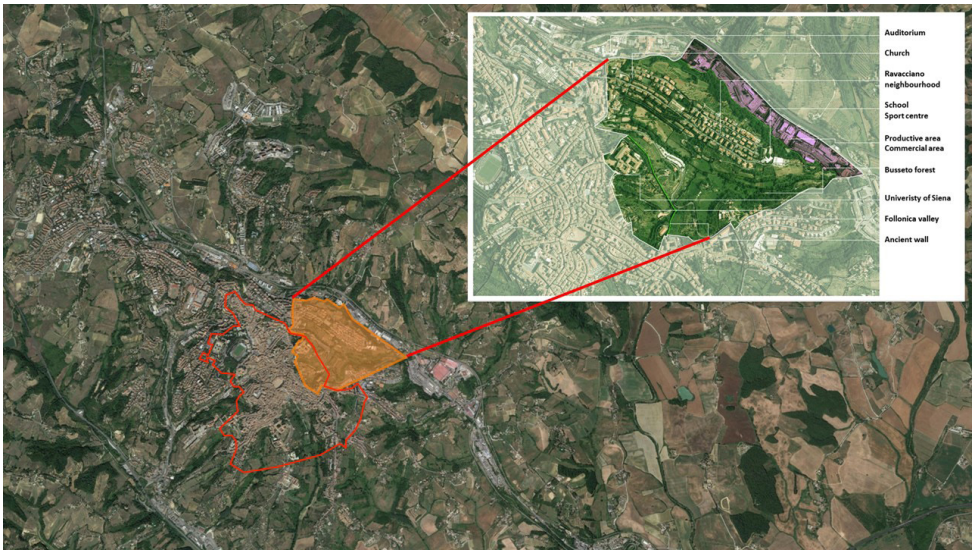
Although it is outside the medieval walls that surround the historic center of Siena, it represents a living and active reality of the city, an integrated part of it and certainly not a peripheral district.

Data on age and gender of the population in Ravacciano neighborhood show that females are almost 56% of residents. Moreover, almost 15% are under 18 years old (248), 38% are over 18 and under 50 (636), 26% are over 50 and under 70 (430) and the over 70 are almost 22% (362). The average age in district in 2019 is 48 years.

The Ravacciano neighborhood and the adjoining valleys are part, also, of the Horizon 2020 URBiNAT project (Urban Innovative & Inclusive Nature), which involves 28 partners, 7 cities (including Siena) and 15 countries. Taking the full physical, mental, and social well-being of citizens as main goal, the URBiNAT project aims to plan a healthy green corridor as an innovative and flexible Nature-Based Solution (NBS), which itself integrates many micro NBS emerging from community-driven design processes (e.g., the restore of the "Fonte d'Ovile" historical water basin and the creation of urban vegetable gardens in the Ravacciano valleys). The selection of Ravacciano neighborhood for the first online City Decarbonization Itinerant Workshop of the ERASMUS+ City Minded Project allows for joining efforts, creating synergies between these two European projects funded by different European Programs.

The objective of the City Minded Workshop was to put together teachers, researchers, students, and local stakeholders to address common onsite challenges and define collaborative urban decarbonization roadmaps for the Ravacciano neighborhood in Siena through a 'learning-by-doing' method.

Figure 1 - Case study area: Ravacciano neighborhood (orange box) and valleys.
Figure 2 - A view of the Ravacciano neighborhood, photographed from the Ravacciano Valley. Source: https://urbinat.eu/


Auditorium
Church
Ravacciano neighbourhood
School
Sport centre
Productive area
Commercial area
Busseto forest
Univeristy of Siena
Follonica valley
Ancient wall

4. Energy efficiency and renewable energy technologies in the active service of the city decarbonization processes

Andrea Poldrugovac, IRENA, Diane Cassar, MIEMA

Abstract

A set of lectures related to Energy Efficiency and Renewable energy technologies were prepared and delivered by IRENA – Istrian Regional Energy Agency and MIEMA – Malta Intelligent Energy Management Agency in the City Minded Itinerant Workshops. The lectures were designed in such a way as to present in an easy and understandable way the importance of energy efficiency and renewable energy technologies in buildings and their correlation with the project's aim of developing urban decarbonisation scenarios for the target neighbourhoods. The sessions were composed of two main components, the theoretical part, which consisted of the presentations of the main features of the topics and the practical part, or the co-working session, where students were engaged in solving exercises and finding solutions to achieve a greener and carbon-neutral target district by proposing energy-related solutions for selected buildings or built areas. Since the project was implemened during the pandemic, the first three workshops (Siena, Rome and Seville) were organised in an online format and all the activities had to be adapted to a format that wasn't originally planned. Despite the "new normal", the results of the online workshops were satisfactory. Fortunately, in July 2022, the project consortium had the possibility to organize the last workshop with the students and teachers in presence in Valletta, Malta, and have the opportunity to test the lectures in a real environment, which in the end will result in more added value for the project objectives.

On the left:
Bordeaux
Credits: Anna Laura Palazzo

1. Introduction

The EU has set ambitious energy efficiency targets for 2030 to reduce primary and final energy consumption as part of its 2050 decarbonisation objectives. By using energy more efficiently, and thereby consuming less, Europeans can lower their energy bills, help protect the environment, mitigate climate change, improve their quality of life, reduce the EU's reliance on external suppliers of oil and gas and support the sustainable growth of the EU economy. To achieve these benefits, energy efficiency needs to be improved throughout the entire energy chain, from production to final consumption. EU energy efficiency measures focus on the sectors with the greatest potential for energy savings, such as the building, industry, transport and energy supply sectors (EU, 2022a). Renewable energy will play a fundamental role in achieving the EU's energy and climate objectives. Energy from renewable sources or renewable energy means energy from renewable non-fossil sources, namely wind, solar (solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass,

landfill gas, sewage treatment plant gas, and biogas (European Parliament and Council, 2018). Renewable energy sources, also called renewables, are energy sources that replenish (or renew) themselves naturally (Eurostat, 2022).The process, by which these renewable resources are converted into energy, emits no net greenhouse gases, which is why renewable energy is also referred to as 'clean energy'. It can be used to directly produce electricity, or heat for our homes and industries. It can also be used for biogases in heat or electricity production, and for biofuels in the transport sector (EU, 2022b).
The set of lectures related to Energy Efficiency and Renewable Energy Technologies was designed to ensure a systematic and comprehensive approach in order to expand the students' knowledge and motivate them to analyse the selected urban area in the terms of the existing building stock and its characteristics, focusing on the energy needs and its improvement by proposing relevant energy efficiency measures with the maximisation of the use of renewable energy technologies. Among different energy consumers in the urban areas, buildings were chosen since the building stock is responsible for approximately 40% of EU energy consumption and 36% of the greenhouse gas emissions. The developed methods and procedures were adapted for the students with a various level of knowledge on the presented topics and with the aim to raise awareness about the importance of conducting selected energy efficiency measures on the targeted buildings together with the use of renewable technologies, both aiming to the achievement of targets set in the local/regional/national energy plans, but also to provide a healthier, greener and sustainable environment.

2. Material and methods

The work with the students was divided into two main parts, the training session consisted of two presentations and a co-working session where the students worked on the practical exercise.
The training session started with the presentation related to the analysis of the building stock of the selected urban area, its possible energy-efficient improvement, detecting potential problems and identifying solutions which were then analysed during the co-working session. The focus of the session was on how to achieve energy-efficient buildings in the selected urban area. Buildings are the single largest energy consumer in Europe and about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient. Unfortunately, only about 1% of the building stock is renovated each year and this number will have to change rapidly in the following years if the targets set in the EU Green Deal are to be achieved. To achieve planned targets, it is necessary to conduct relevant energy efficiency measures, which were presented to the students in five typical categories aimed to reduce heating demand, cooling demand, energy requirements for ventilation, energy use for lighting and energy used for heating water.
The second part of the training focused on the integration of renewable energy systems within the urban scenario as part of the urban energy strategy. Photovoltaic panels, micro-wind turbines and combined heat and power

plants were presented as different types of renewable technologies that can be integrated in the urban built environment for the generation of clean energy. Micro-grids and energy communities were also presented as citizen-driven energy actions that can contributed to city decarbonization. By supporting citizen participation, energy communities can help providing flexibility to the urban electricity system through demand-response and storage. A number of best practices from Malta and other European countries in relation to the integration of RES for self-consumption were also presented. These included building-integrated photovoltaic systems, PV facades, solar parking shading devices and geothermal heat pumps.

The co-working session was the only part of the module which had the possibility to be implemented online (Siena, Roma, Seville) and in the real environment (Valletta). In the online mode, the exercise was divided into six tasks, and the one in Valletta was more focused on practical analysis of the area and consisted of four tasks. The online exercise started by dividing students into groups (4-6 students per group) and by selecting a target building or a target zone. Each group was asked to select a different building type or a group of buildings. The first group should select a school building, the second group a residential area (a block of apartments or a group of houses in a street) and the third a commercial building. The second task was the identification of the main energy consumers within the building/s chosen and listing the three highest energy consumers according to their opinion and explaining why they have chosen them. The third task was related to the proposal of energy efficiency or renewable energy interventions. Based on the highest energy consumers identified as part of the second task, each group was asked to propose what energy efficiency measures may be implemented in the building/set of buildings to reduce the consumed energy and improve the energy performance of the buildings. Depending on the building characteristics, students were also asked to propose any renewable energy technologies that can be integrated. The fourth task was focused on detecting possible challenges that will make energy improvement difficult both for the energy efficiency measures and renewable energy sources (financial, social, legal or technical barriers to energy renovation). In the fifth task, based on the challenges and barriers identified, students had to propose solutions to overcome the challenges. A more practical task was the sixth one which was related to the estimation of the potential energy generated yearly by the installation of photovoltaic (PV) panels on the selected building. Each group was asked to measure the area that can be used for the installation of PV on the selected building/group of buildings through Google Maps. Then they had to estimate the size of the PV system that can be fitted onto the roof (kWp), and in the end calculate the potential energy generated yearly.

As regards the Valletta workshop, the exercise was more practical since there was finally the opportunity to test the methodology and procedures in a real environment. The first group selected the building of the Valletta Design Cluster and their first task was to identify the measures already

Figure 1 - Possible energy efficiency and renewable energy solutions for the City of Valletta

implemented for energy efficiency and renewable energy in/on the building. The second task was to propose additional measures to maximise the energy performance, the third one was to identify challenges and mitigation measures for the implementation of the proposed measures and the last task was to propose an implementation timeline (short, medium, long term). The second group had to select a building/group of buildings in the City of Valletta and then identify aspects of the area which have a bad energy performance and what would be the main energy consumers. Then the group should propose measures to maximise the energy performance (EE + RES) and identify challenges and mitigation measures for the implementation. The last task was to propose an implementation timeline (short, medium, and long term) for the proposed measures.
After the conducted exercise, both in the online and Valletta workshop, each group prepared a short presentation with all the results of the above-mentioned tasks and presented them to the professors and the audience of the workshop.

3. Results and Discussion

By taking into consideration the limitations of the online workshops, the results of the student's work provided a set of comprehensive solutions and measures related to the improvement of energy efficiency and the use of renewable energy technologies in the selected urban areas of Siena, Rome and Seville.
By analyzing the results, it can be highlighted that as the main energy consumers in the selected areas, students detected the heating and cooling systems, different home appliances and lightening systems. The students were the most imaginative in their proposals related to EE/RES. The proposals included the use of photovoltaic (PV) systems on the

roofs of existing buildings or on the used spaces (parking lots), the use of heat pumps, the use of nature-based solutions as a waterproofing system (rain gardens) and the use of vegetation and green areas to decrease the heat island effect. As the main barriers to conduct energy renovation and fostering the use of renewables, the students detected aesthetic problems or conservation rules related to the PV installation, lack of funds, legal problems (related to the ownership rights of the buildings), and technical problems. The need for awareness campaigns, adequate incentives and financial loans, and the need for more specialized and qualified workers were listed as possible solutions in the selected areas to overcome the barriers. On the other hand, the workshop in Valletta, provided a more comprehensive set of results since the students had the possibility to visit in person the target area and detect the weaknesses and propose adequate interventions (Figure 1) in the terms of enhancing the energy features of the buildings and boosting the use of renewables. The workshop in presence gave the opportunity to the students and teachers to interview the users and flat owners in order to collect valuable inputs regarding the energy performance of the buildings, interventions made and what are the challenges that the owners are facing, particularly in terms of energy consumption and living comfort.

4. Conclusion

The goal of the Energy Efficiency and Renewable Energy Technologies lectures was to provide a systematic and comprehensive pathway aiming to expand the student's knowledge and motivate them to analyse the selected urban area in the terms of the existing building stock and its characteristics, focusing on the energy needs and its improvement by proposing adequate energy efficiency measures correlated with the use of renewable energy technologies. After the organization of the four workshops, and taking into consideration that the methodology was developed from scratch, it can be concluded that the methodology worked very smoothly in the online environment but the workshop in the real environment gave more opportunity to produce tangible results than the online ones. Nevertheless, the developed methodology can work under both conditions, which brings an added value to the project. The work between the students and teachers from different Universities and with different levels of knowledge has provided significant proposals for the energy efficiency improvement of the selected target areas, which then can be used by stakeholders and practitioners to prepare actions aiming at achieving carbon neutrality in the upcoming years.limitations of the online workshop.

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BOX 4_Valletta

Valletta is the capital city of Malta, located on a peninsula between two natural harbours, Marsamxett and the Grand Harbour. It is the southernmost capital of Europe and the European Union's smallest capital city with an area of 0.61 square kilometres.

The foundation stone of Valletta was laid by Grand Master Fra Jean de Valette (1557-1568) of the Hospitaller Order of St John the Baptist (Order) on 28 March 1566. Politically the decision to build Valletta reflected the will of the Grand Master to have the Order permanently in Malta following the victory over the Turks in the 1565 Siege of Malta. Culturally Valletta was meant to reflect the image of what was then perceived to be the southernmost point of diffusion of an emerging Baroque European culture.

Valletta was designed by engineer Francesco Laparelli da Cortona, appointed by Pope Pius V. Valletta was one of the first examples of a fortified city built ex-novo in the 16th century to the conventions of the Italian bastioned system of fortification - a city designed alla moderna to combine the ideals of fortification and urban planning. Two important aspects of the well-fortified city of Valletta in its early years concerned the presence of secret underground passages, and a water management system which were vital for the survival of the city. The Valletta Commission, dating back to the Order of St. John in the 16th century, enacted a series of regulations covering key aspects of development, which have resulted in the form and layout of the City today.

Valletta was officially recognised as a World Heritage Site by UNESCO in 1980 and was the European Capital of Culture for 2018. Valletta was designated as an Urban Conservation Area in 1995 and all properties in Valletta, including in the waterfront zones are considered to be of historical value and conserved.

Economically, Valletta is one of the most important business and financial centres on the Maltese Islands. However, it continues to experience a population exodus. During the British rule (1800 - 1964) Valletta saw its population peak to more than 24,000 up till 1939. However, since the 1980s, more and more residents have moved out of the city and less are settling with the present population being around 6,000. This resulted in increasing the number of vacant and abandoned properties.

Valletta's urban morphology results in several challenges which need to be addressed as part of the decarbonisation process of the city. These include a very high density of historic buildings which re protected and limit renovation potential, degradation of vacant buildings, excessive vehicular traffic and lack of green infrastructure and pedestrian zones.

Figure 1 - Barrakka gardens in Valletta.
Credits: Lorenzo Barbieri
Figure 2 - A view of Valletta.
Credits: Romina D'Ascanio

5. Incorporating Nature. Urban sustainability Lessons from Italian Planning

Anna Laura Palazzo, Federica Di Pietrantonio, Università degli Studi Roma Tre

Abstract

Over the last decades, well ahead of climatic and environmental warnings, Italian urban planning and design practices have been increasingly encompassing within their scope nature – both the wild and the tamed – addressing every single dimension of sustainability and human well-being.

On the backdrop of general debates in the European framework, and in tune with valuable scholarly achievements, this contribution focuses on several approaches tackling history and nature to attain continuity of open space. As a result, a wide-ranging statute of landscape, also implying semantic shifts in common language, claims for joint expert and non-expert knowledge involvement in envisioning and shaping communities' future.

On the left:
Torrino Mezzocammino, Roma
Credits: Anna Laura Palazzo

1. Introduction

Generally speaking, sense of place typical to European and Italian urban planning and design practices has proven a most relevant part of current reflection on cityscape, affecting human behaviors and relationships while shaping insiders' and outsiders' perception, notably in dealing with historic centers hosting a huge urban heritage to be preserved and passed down to future generations. Thus, current planning and regeneration practices are daily confronted with environment, territory, and landscape, that pertain to different fields of knowledge despite their unavoidable overlapping (Table 1).

Table 1: False friends. A Glossary of common use terms

ENVIRONMENT	The English term refers to: *1) circumstances, objects, or conditions by which one is surrounded.* *and* *2.1) the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival;* *2.2) the aggregate of social and cultural conditions that influence the life of an individual or community* (Merriam-Webster Dictionary) There is a good correspondence with the Latin ambiens-entis, as a surrounding space.
TERRITORY	The English term refers to *an area of land under the jurisdiction of a ruler or state*. In Neo-Latin languages, its use is much more spread. From the original meaning of cultivated land (*terra*), the term has taken on wider and more complex meanings over time, accounting for organized human settlements and related activities, eventually encompassing principles of sovereignty within political-administrative circumscriptions with defined borders.
LANDSCAPE	The English term refers to *all the visible features of an area of land, often considered in terms of their aesthetic appeal* (Oxford Languages). The term *paesaggio*/*paysage*/*paisaje* conveys the idea of *paese*/*pays*/*país*, thus evoking the action of moving from the inside to the outside, from known places to unknown ones to be appropriated. Over time, *landscape* ended up coinciding with the perceived result of the manifold relationships of human societies with their environment and the territory where they live and operate.

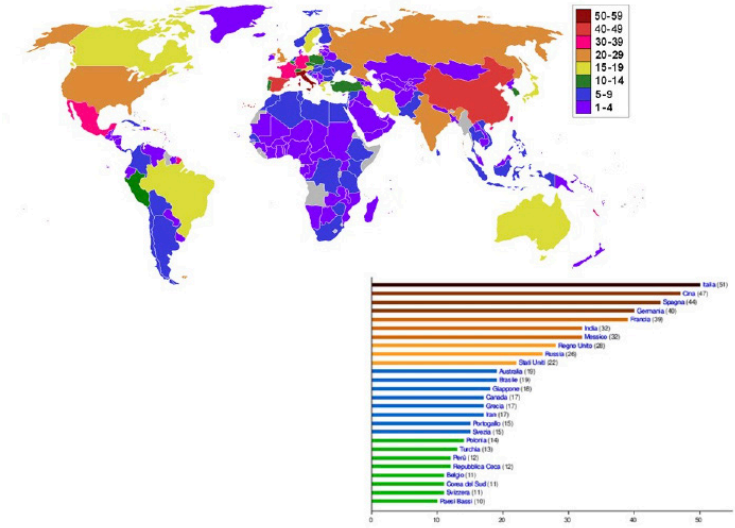


Figure 1 - World Heritage Sites – Europe and North America host 48% of the listed items, while these territories account for only 16% of the world population, a rate of 40 items listed for 100M inhabitants. By comparison, the rate is 5/100M in Asia, 10/100M in Africa, 20/100M in the Arab States and 21/100M in Latin America. Credits: UNESCO

In Italy, the *placemaking* approach, aiming at creating people-centred places, capitalizing on local community assets, inspiration, and potential, has been encompassing all kinds of settlements and regional areas as well, under two main assumptions: (i) an effective and socially sustainable planning should be place-specific; (ii) irrespective of the scale involved, the main focus should be on public space, deemed as the most authentic dimension of community relationships. Accordingly, placemaking entails dynamic surveys of all kinds of outdoor spaces liable to incorporate new uses, thus renewing the vitality of the city. At the turn of the century, a third attitude has gained a foothold. Well ahead of the European Strategy for Green Infrastructure (2013), the point was to encompass nature along with heritage within urban and metropolitan governance schemes, accommodating within local planning all features of greenery liable to increase the overall environmental performance (i.e. prevention of global warming phenomena by fixing carbon dioxide), along with design criteria and rules concerning general requirements and place-specific settings and endowments of open space (conformance).
In turn, for some years now all over Europe the demand for less energy-intensive consumption patterns aligns with 'good city form' issues affecting both regeneration and redevelopment practice.
These fundamentals are at the basis of operational approaches connecting the human realm and the one of nature, from both the fields of humanities and life science.

2. General Overview

Over time, there has been a slow yet steady rapprochement between man and nature, retrieving the missing linkages between protection and safeguarding principles of natural components and artifacts in the light

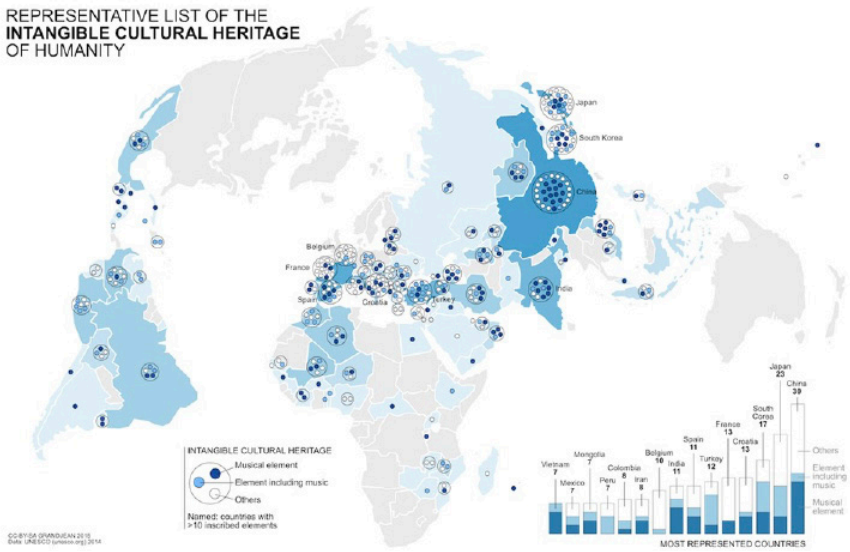


Figure 2 - Intangible Cultural Heritage. Implicitly, the intangible cultural heritage directory aims to restore a form of balance, including a new element to list. As a result of a political choice to favor the marginalized elements, the number of intangible heritage elements in North America and Europe are less numerous (but still 33% of the new list). Asia, meanwhile, is better highlighted. Credits: SA_Grandjean, 2015.

of the United Nations Educational, Scientific and Cultural Organization (UNESCO) International Conventions (Figs. 1-2). Additionally, a general understanding about landscape as the common ground for man-nature interplay has widespread. Such trends have marked protection, planning and management milestones (Table 2). Both UNESCO in categorizing World Heritage Cultural Landscapes, and the International Union for Conservation of Nature (IUCN) in establishing Category V *Protected Landscapes*, frame landscape as the result of human relationships with the natural environment (Phillips, 2002). The first approach stresses the relevance of human history, cultural traditions, and social values and aspirations, while the second one emphasizes natural environment, biodiversity conservation, and ecosystem integrity (Brown et al., 2005).

A relentless move towards more people-centered approaches has been notably stated by the Council of Europe, deeply inspiring the way heritage and landscape discourses are currently politically acknowledged and addressed.

Expert and general public awareness over tangible and intangible assets have gradually broadened to include all types of living environments, converging over a concept of cultural landscape as a powerful means for social identification and a source of inspiration for embracing sustainable development paths (Hawkes, 2001). Firstly, the European Landscape Convention (2000) has provided an essential stimulus to this end, by framing landscape (including natural, rural, urban and peri-urban areas) as a common ground for sharing opinions and visions, targeting so-called *landscape quality objectives*, and ultimately achieving integration between different policy design measures, actions and tools for landscape protection, planning and

Table 2. A Timeline

1992	World Heritage Convention	UNESCO	Definitions of heritage: *Heritage is our legacy from the past, what we live with today, and what we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration.* *The following shall be considered as natural heritage: (i) natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view; (ii) geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation; (iii) natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.* (Article 2
1992	World Heritage Convention	UNESCO	The World Heritage Convention is the first international legal instrument to recognize and protect cultural landscapes. Accordingly, Guidelines concerning their inclusion in the World Heritage List have been enforced.
2011	*New life for historic cities: The historic urban landscape approach explained*	UNESCO	The booklet addresses the challenge of integrating the goals of urban heritage conservation and those of social and economic development. *The Historic Urban Landscape approach moves beyond the preservation of the physical environment and focuses on the entire human environment with all of its tangible and intangible qualities. It seeks to increase the sustainability of planning and design interventions by taking into account the existing built environment, intangible heritage, cultural diversity, socio-economic and environmental factors along with local community values* (https://whc.unesco.org/en/news/1026)
2000	European Landscape Convention	Council of Europe	Landscape is framed as *an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors, […] an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity. Landscape quality objective means, for a specific landscape, the formulation by the competent public authorities of the aspirations of the public with regard to the landscape features of their surroundings.*
2002	Management guidelines for IUCN Category V protected areas: protected landscapes/ seascapes	International Union for Conservation of Nature and Natural Resources (IUCN)	IUCN is an influential independent body founded in 1948 and composed of both government and civil society organizations, that established a Commission Task Force on Category V, *Protected Areas.* *Protected Landscapes* are acknowledged as areas shaped by long-standing human-nature relationships, gathering significant ecological, biological, cultural and scenic value. The *protected area management*, acknowledged by international bodies such as the United Nations and many national governments as the global standard, draws upon global expertise and fosters such approach through specific Guidelines with the aim of *safeguarding the integrity of this interaction that proves vital to protecting and sustaining the area and its associated nature conservation and other values.*

2003	Convention for the Safeguarding of the Intangible Cultural Heritage	UNESCO	The intangible cultural heritage is defined as *the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity* [. . .].
2005	Millennium Ecosystem Assessment	UN Secretary General	Called for by the United Nations Secretary-General Kofi Annan in 2000, launched in 2001 and published in 2005, it is a major assessment of the human impact on the environment, defining ecosystem services as *the multiple benefits provided, directly or indirectly, by ecosystems to humans and contribute to the well-being of communities*. They are grouped into four broad categories: (i) provisioning, such as the production of food and water; (ii) regulating, such as the control of climate and disease; (iii) supporting, such as nutrient cycles and oxygen production; and (iv) cultural, such as spiritual and recreational benefits.
2011	Faro Convention on the Value of Cultural Heritage for Society	Council of Europe	The Convention establishes rights and responsibilities to and for cultural heritage, stating that *rights relating to cultural heritage are inherent in the right to participate in cultural life, and that everyone has the right to benefit from the cultural heritage and to contribute towards its enrichment.* The Faro Convention also focuses on promoting sustainability, access, and the use of digital technology in the context of cultural heritage.
2013	Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "Green Infrastructure (GI) — Enhancing Europe's Natural Capital"	European Commission	The Green Infrastructure Strategy defines GI as *a strategically planned network of natural and semi-natural areas with other environmental features, designed and managed to provide a wide range of ecosystem services, which are the benefits that flow from nature to people, such as water purification, air quality, space for recreation and climate mitigation and adaptation. This network of green (land) and blue (water) spaces can improve environmental conditions and therefore the health of citizens and the quality of life.* The international debate assigned GI a cross cutting and multi-scalar statute, and a key role in targeting environmental sustainability goals and addressing the ecological transition (Davies et al., 2006, Hansen and Pauleit, 2014). These stances, spurred by a decades-long reflection also stressing the importance of creating/restoring ecological connectivity to counter land fragmentation, are in tune with spatial planning initiatives throughout Europe.
2020	Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "EU Biodiversity Strategy for 2030. Bringing nature back into our lives"	European Commission	As an essential component of the Green Deal, the Biodiversity Strategy states the priority of protecting biodiversity and ecosystems to address the climate change, highlighting how Green Infrastructure contributes to the cooling of urban areas, mitigation of the impacts of natural disasters, protection, or restoration of biodiversity at different scales. The scenario of a coherent and resilient trans-European natural network has as a precondition the creation of ecological corridors to prevent the genetic isolation of species, allowing their mobility and maintaining or improving ecosystems.

Figure 3 - Montepulciano. View of the city. Credits: Pixabay.

management. According to current experiences in participatory planning, communication about landscape and environmental issues is being brought outside the inner circle of experts, towards the population involved in planning decisions. People are increasingly interested in discussing plans, schemes and renderings related to alternative development scenarios. A decade later, further insight was provided by the so-called *Historic Urban Landscape approach* (HUL) by UNESCO, bringing landscape issues in urban environments: "Rather than a case-by-case approach, cities and their key stakeholders are coming to realize that heritage planning and urban conservation can no longer be handled in isolation", and, as such, "heritage as a concept also requires redefinition with the further enhancement and adoption of more sustainable models of resource consumption and production. A global challenge requires supranational goals" (Pereira Roders, 2019).

As a matter of fact, historic cities constitute the largest heritage category on the World Heritage List, with over 250 inscribed sites out of more than 900: "Historic Urban Landscape seems to be the proper term to describe the contents of the contemporary historic urban centres and the doubts related to its definition. The lower level of territorialization expressed by the choice of landscape allows a larger scope of social actors to identify themselves with this territorial entity [...]. The interrelatedness of place, local community, local practices and local identities through legislation and use of urban cultural heritage protection has presented itself as a new exciting field of study" (Somkoly, 2017).

Concurrently, the interplay between nature and communities highlighted by the Millennium Ecosystem Assessment (MA, 2005) introducing the concept of *ecosystem services*, has further been

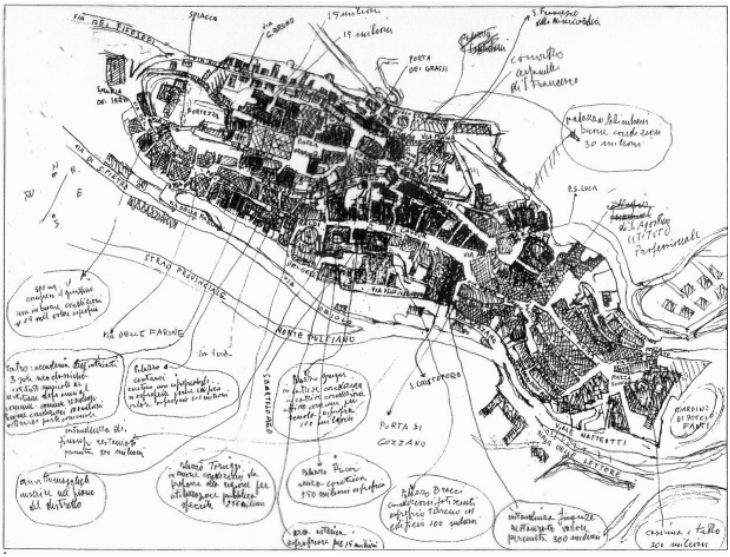


Figure 4 - Montepulciano Master Plan (G. Samonà, M. Marchetta, A. Samonà). In: G. Samonà, I contenuti e le linee del Piano particolareggiato di Montepulciano, "Casabella", Issue 444, XLIII, Feb. 1979: 17-25. Each context is a set consisting of artifacts, streets and plazas linked by contiguity to a main street acting as their formal and substantial backbone. Such a continuity between streets and building volumes conveys a strong, vivid image.

framed by the EU Green Infrastructure Strategy (EC, 2013), which has proven its effectiveness mostly in the built environment. Since 2011, when the EU launched the Biodiversity Strategy (EC, 2011) setting objectives to be achieved by 2020, new approaches have been placing the GI at the core of regeneration measures, to improve both the Natural Capital and the environmental quality within urban areas. As for the latter, slow mobility systems and green areas with high environmental and landscape quality provide communities with safe access to a variety of outdoor recreational and work activities.

In turn, the new European Biodiversity Strategy 2030 (EC, 2020) states that the promotion of healthy ecosystems, green infrastructure and nature-based solutions in urban and peri-urban areas should be systematically integrated within urban practices and planning.

3. Planning on Trial. A Glance to Italian Placemaking

How and to what extent can placemaking contribute to current debate in the light of energy and ecological transition?

As a matter of fact, in the historic city greenery had not a statute of its own: *the wild* was pushed beyond the city walls, in the form of *saltus* (forests and pastures) and *silva* (woods), turning, when necessary, into *ager* (arable land), whereas *the tamed* burst quietly inside private spaces protected by high fences, such as courtyards, gardens, and allotments. Only across the past century has greenery increasingly been used to underpin the plot structure of the city, somehow emphasizing its diverse value of form and memory. From the eighties onwards, *nature in the city* has been taken into account within plans and a variety of design tools, such as schemes, diagrams, guidelines, etc.

The conceptual framework of current

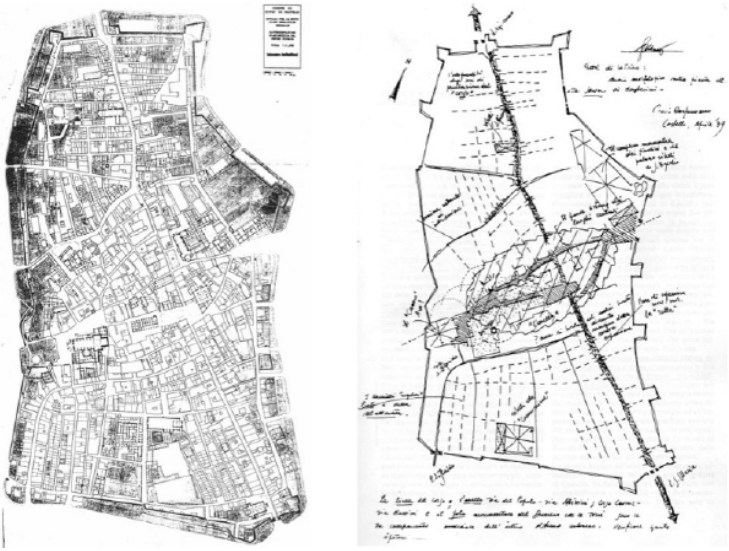


Figure 5 - Città di Castello, schemi per il nuovo Piamno regolatore generale (Antonino Terranova, Orazio Carpenzano). In: Antonino Terranova, Obiettivi e strumenti del progetto dell'esistente. Dal recupero edilizio al piano di riqualificazione e restituzione urbana, Rassegna di Architettura e Urbanistica, n. 71-72, 1990: 34.

reflection on the city has been fostered by different fields of investigation and research approaches grounded in interdisciplinary studies; whatever the case, *duration* (process over time) has come to the fore as the most innovative aspect, affecting city syntax and shaping urban landscapes.

3.1. *Morphology VS Typology. City as a Text*

The first approach, by far the most enduring in the Italian experience, is rooted in morphology, intended as the dialectical relationship among general and specific spatial elements, and claims for the city as an assemblage of meaningful forms standing together like the words in a sentence. The *City as a Text* metaphor allows for overwriting, i.e. the establishment of new elements and uses, provided that they comply with the span and rhythm of urban fabric. Duration is taken into account, in the sense that city forms are more stable than uses: accordingly, despite the ravages of time, historic cities hold on by accommodating new uses into a given *Forma Urbis* according to inhabitants' needs. Therefore, what we call *Forma Urbis* (the image of the *city as a whole* in the perception of its users) is deemed stronger than the permanence of the original building typologies, hardly attainable after centuries of changes and adaptations. The building fabric displays continuous layers and rearrangements of pre-existing materials, more or less consistent with each other, often resulting in architectural units partly or wholly different from the original ones. Nevertheless, the overall image and identity of the city persist.

The Master Plan of Montepulciano addressed the whole city, unveiling strong linkages between natural characters and artifacts of the original town despite transformation over time, as well as the connections between the road system and the urban fabric

Figure 6 - Siena. View of the city. Credits: Pixabay.

(Samonà, 1979). The morphology of the hill is at the base of the urban pattern: continuous strips of buildings and streets laid out prevalently from north-east to south-west according to contour lines split the city within the walls into five areas, different in size and importance. Each part has its own character that can be defined as a *context*. In turn, each context is divided into morphological systems, a group of similar buildings which together form a *unit* (Figs. 3-4). Such planning approach incepted a long-lasting debate over the rules generating urban forms and the relationship between morphology and typology.

3.2. *Performing Urban Structure*

The second approach challenges the concept of urban structure that has been defined and dealt with by influential works, albeit based on different assumptions. Compared to Kevin Lynch's *The Image of the City* (Lynch, 1962) addressing the perceptual form of urban environments caught by mental mapping (paths, edges, districts, nodes, and landmarks), the Italian way to urban structure originally hinges on the concept of *permanence*, which affects collective and individual artifacts in the city in different ways (Rossi, 1966). "The two main permanences in the city are housing and monuments. With respect to the first, Rossi distinguishes between housing and individual houses. Housing is a permanence in the city while individual houses are not; thus, a residential district in the city may persist as such over many centuries, while individual houses within a district will tend to change. With respect to monuments, the relationship is the opposite, for here it is the individual artifact that persists in the city. Monuments are defined by Rossi as primary elements in the city which are persistent and characteristic urban artifacts. They are distinguished from

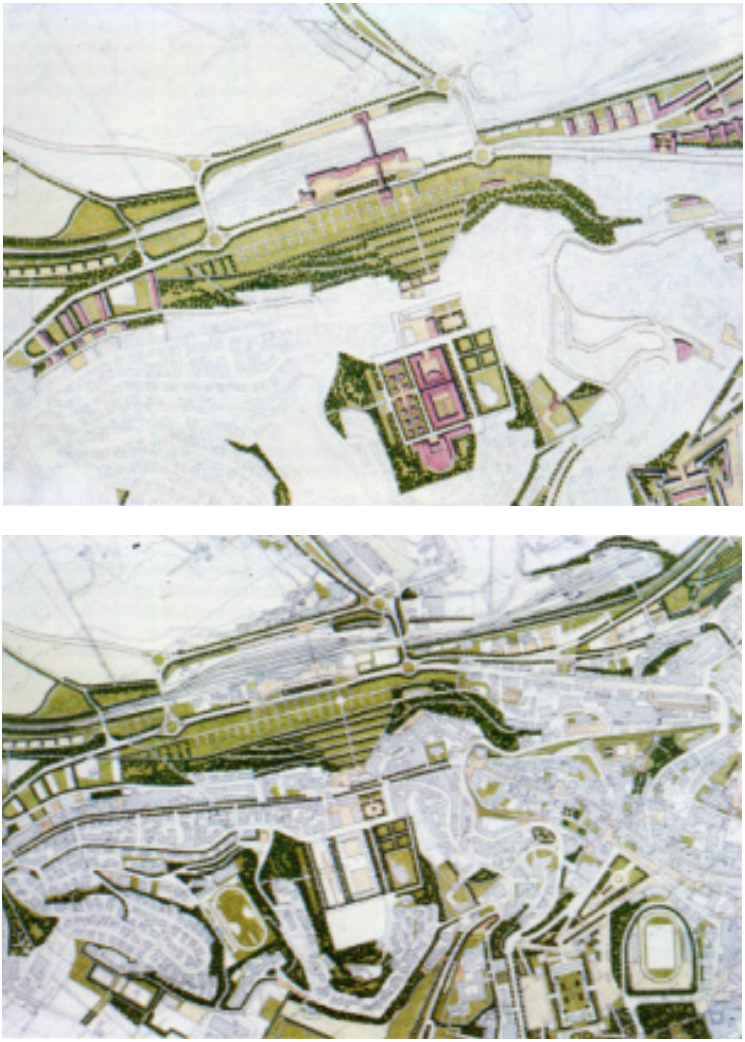


Figure 7 - Siena, Master Plan and the Project of the Soils (Bernardo Secchi). In "Urbanistica", n. 99, giugno 1990: 42.

housing by their nature as a place of symbolic function, and thus a function related to time, as opposed to a place of conventional function, which is only related to use" (Eisenman, 1982).
The concept of permanence couples tangible and intangible relationships within urban fabric, allowing *primary elements* belonging to the public sphere to emerge: streets, paths, city walls… (Figs. 5-8).
Nature is also called upon: squares, tree-lined streets, green areas, rivers and waterways, along with their physical and visual relationships, are being connected in the so-called *progetto di suolo* (Secchi, 1990), shaping the outdoor space as a *continuum* that proves beneficial for humans (and other species).

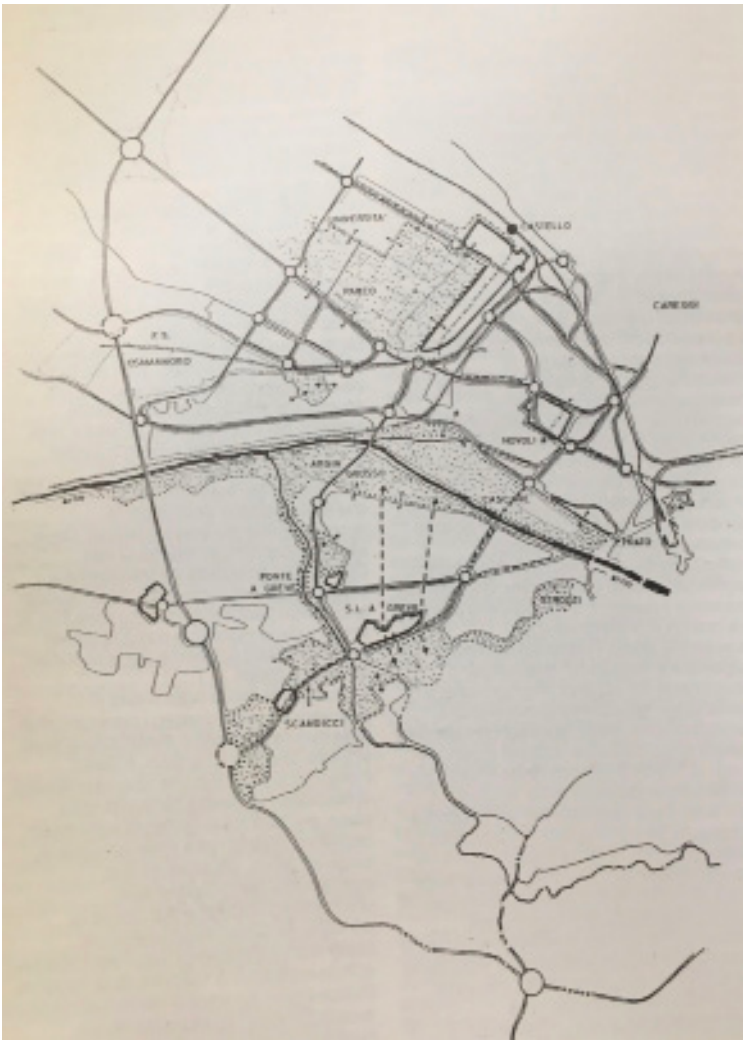


Figure 8 - Firenze, Preliminary Layout (Giuseppe Campos Venuti). In: "Urbanistica", n. 95, giugno 1989: 34.

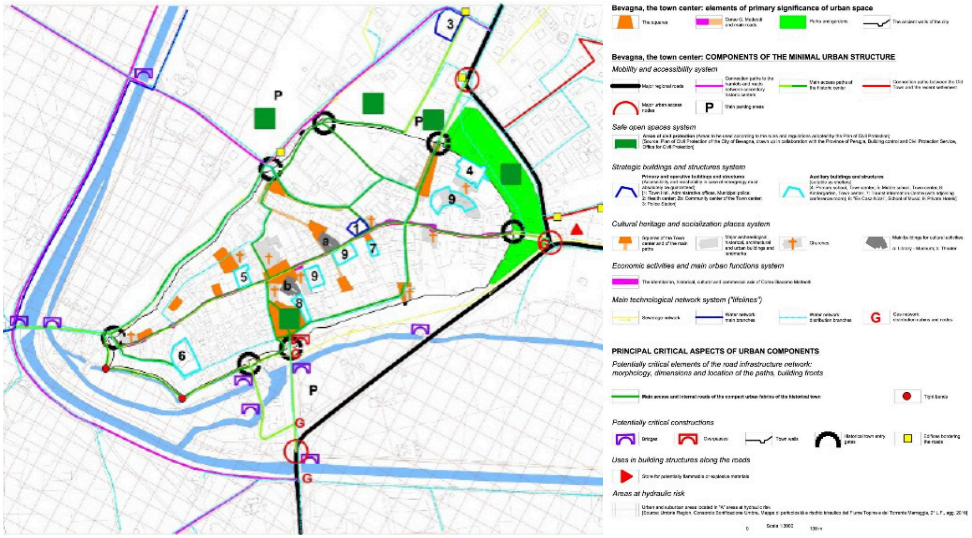
Quite recently, under the pressure of destructive earthquakes, urban structure has been at the core of new concern about vulnerability of cities and has spurred an interesting research field, supported by several regional laws. The likeliness of the loss of a city's organization during an earthquake entails the reading of crucial priorities in the urban structure, that is, places and connections of primary importance. They may include strategic structures, different areas relevant for civil protection targeting, sites and building compounds with special functions, the town's main sites, entry points, etc. At the same time, the main connections may be different in nature, including main thoroughfares, technological networks of various

types, etc.
In the case of Bevagna, such linkages between seismic vulnerability of the town's areas, urban morphology, and urban planning have been deepened. The results have demonstrated that the layout and density of the building fabric, buildings' size and proximity to each other influence, differently and in many ways, the response capability of a seismic-risk town (Figs. 9-10).

3.3. *Landscape and Memory*
Contemporary urban planning allocates a key role to history and memory, identity of places and communities in restoring quality to large portions of the existing city. For some time now, participatory planning, along with drawings and other communication tools, has been providing communities with the experience of places to keep alive the awareness of current times merging common perceptions and personal inscapes.
Somehow anticipating the European Landscape Convention (2000), the third approach marked a fundamental step towards the acknowledgement of the sense of place, questioning *everyday landscapes*. In such cases, the idea of landscape as *form* and *memory* seemingly acts more as a sort of aura than as a material resumption of past traces. Anyway, the legitimacy of any transformation relies almost entirely upon the landscape project.
In the Lucca Plain, the historic *Contado delle Sei Miglia*, and the surrounding hills to the south, various rural patterns have been strongly marked by continuous human permanence since ancient date, which has left, apart from evident material traces, also tiny but persistent signs in the richness of toponyms (Caponetto et al., 2002). The ancient landscape of scattered settlements hardly emerges because of the densification due to industrial development after the Second World War, and can only be grasped in the persisting original system of courtyards grouped into small settlements, at times incorporating religious buildings

Figure 9 - Bevagna. View of the city. Credits: Antonio Cappuccitti.

Figure 10 - Bevagna, Map of the Minimal Urban Structure (Town Centre); annex to the Programmatic Document of the General Municipal Plan, 2013. The map highlights the close complementarity between the Minimal Urban Structure and the morphological structure of the historical settlement. The Minimal Urban Structure is made up of all the elements of a town which are strategic from a functional and accessibility point of view (road networks, infrastructures, communication networks and their relative hubs, evacuation routes and safe areas, key functional hubs), but also those places linked to community identity, and productive and cultural functions which can play an important role in the town's recovery.



[http://www.comune.bevagna.pg.it/mediacenter/FE/articoli/nuovo-prg-comunale-procedura-di-vas.html]. Working group of the Municipal General Plan of the Municipality of Bevagna: Giuseppe Imbesi (Coordinator), Antonio Cappuccitti (scientific collaboration), Mario Cerqueglini (Geology), Paolo Colarossi, Carlo Di Berardino, Paola Nicoletta Imbesi, Elio Piroddi, Carlo Sportolaro (Agronomy).

In: A. Cappuccitti, Earthquake, urban form and city planning: research perspectives, "City Safety Energy Journal", 2014, Issue 2, July-December 2014, at 15-28.

(*pievi*).

Single-crop farming, as a countermeasure to rural abandonment given the highly split-up land pattern, has modified farming typologies in the Plain, where the typical fields with annual rotations and mulberry plantations described in the 19th century have quite disappeared. Lastly, the traditional hill landscape, linked to the *villa* type settlement and the terracing system, still resists due to the difficulty of introducing machinery and the resistance to the *rittochino* system that has reshaped almost everywhere the hill slopes. Here, visual and productive relations between rural artifacts (whether dwellings of aristocrats or humbler farmhouses and farm buildings) and their pertaining territory, are still readable (Figs 11-13). These details, like as many mosaic tyles capturing dense and relevant lifestyle patterns somehow resisting to change, convey specific aspects, such as government systems, trade relationships, social life and religious beliefs, mobility, architecture, and notably urban-rural linkages within the Plain. The overall image stands as a palimpsest, interweaving connections among different players and their interests that account for the overall identity value in the area.

4. Landscape on the move. Spatial planning and environmental approaches

Over the last decades, the pace of nature's tampering has accelerated, with only partially reversible phenomena. In Italy, pioneering experiences dealing with landscape ecology date back to Law 394/91 (Framework Law on Protected Areas), followed by regional laws addressing areas with different protection levels. Only recently has this same attitude entered our cities, with a major contribution from non-expert knowledge collected by Regional Landscape Observatories. Thus, *the study of man and the rest of nature*, at the basis of environmental history, also

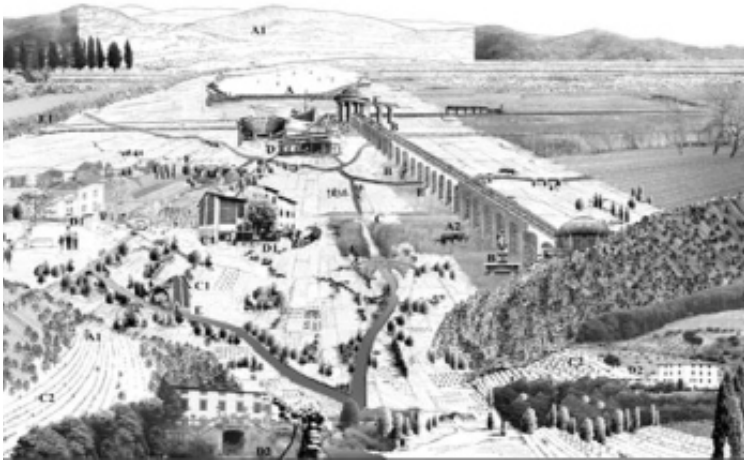


Figure 11 - Lucca and the Contado delle Sei Miglia. Heritage and Identity representations in planning practices. After an in-depth historical survey illustrating the functional structure of the Lucca Plain along the centuries, some drawings sketch out visions and expectations bridging common and expert knowledge. Such synthetic images that anticipate the concept design hold heteronomous expressions (overwritings, out-of-range, contaminations in visualization techniques) deliberately distant from traditional planning tools.

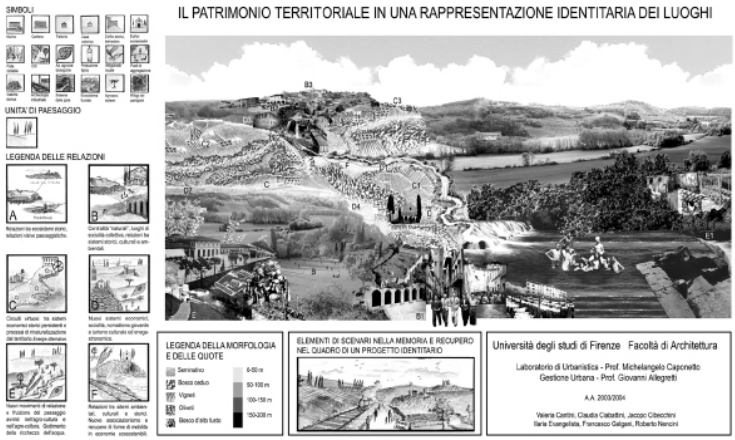


Figure 12 - Lucca and the Contado delle Sei Miglia. Heritage and Identity representations in planning practices.

Figure 13 - Lucca and the Contado delle Sei Miglia. Listing the characters contributing to the identity framework in the Lucca Plain during the Ancien Régime (F. Balletti, M. Caponetto, A. L. Palazzo, Rappresentazioni eterodosse dell'identità locale progettando con gli abitanti: S. Concordio a Lucca, in: A. Magnaghi (ed.), La rappresentazione identitaria del territorio. Atlanti, codici, figure, paradigmi per il progetto locale, Firenze, Alinea, 2005, at 151-168).

lies at the core of recent investigation in town planning and city design, where any rapprochement between life sciences and humanities is expected to unveil human-nature solidarity and trade-offs.

Co-evolution has become the main focus of analytical surveys, rooted either in the 'socio-metabolic' model borrowed from ecological economy, or 'urban metabolism', or else 'ecological heritage' approaches. Such broad area of studies proves fruitful in mitigating the determinism of intrinsic cultural or institutional factors.

On the theoretical ground, environmental history, focusing on the interplay between anthropic and environmental systems as they were historically set up, offers a lens for a better understanding of past events, helping assessing inherent sustainability in current development paths and providing alternative scenarios to the trend one, In fact, although knowledge of the past does not place us in a position to foresee the future, it undoubtedly gives us a better understanding of the times in which we live (Agnoletti, Neri Serneri, 2014: XIV). A wide range of approaches have been adopted, ranging from exclusively ecological settings to more advanced arrangements encompassing ecological networks within spatial planning on a regional and city level. Those city councils that are fully aware of the consequences of these assumptions have been embracing a wide notion of urban ecology as an essential ingredient and a testing ground for spatial planning, called upon to ensure the social sustainability of decarbonization measures in the urban environment.

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Afterword. City Minded and beyond

Anna Laura Palazzo

> *Then we come to man and his place in the system of life. We could have left man out, playing the ecological game of "let's pretend man doesn't exist." But this seems as unfair as the corresponding game of the economists, "let's pretend that nature doesn't exist."*
>
> *The economy of nature and ecology of man are inseparable and attempts to separate them are more than misleading, they are dangerous. Man's destiny is tied to nature's destiny and the arrogance of the engineering mind does not change this. Man may be a very peculiar animal, but he is still a part of the system of nature.*
>
> Marston Bates

1. Coupling the spatial and environmental discourse at neighoborhood level

The CityMinded Project has been implemented along a crucial period that witnessed the outburst of the largest conflict in Europe after WW2 resulting (also) in unprecedented energy cost burdens, during a most challenging energy and ecological transition, and at the very beginning of the Green Deal. If the pace of the transition is likely to slow down, the European Union is developing specific strategies to stick to the ambitious objectives set up in COP conferences, being sustainability of cities a major challenge.

The core idea of CityMinded was to promote an interdisciplinary approach to climate resilience in urban environments among students from different fields (UniSi: Department of Physical Sciences, Earth and Environment; RomaTre: Department of Architecture; UPO: Department of Geography) by exploring the entanglement among 'good city form' (conformance issues), quoting a seminal work by Kevin Lynch, and 'design with nature', according to Ian Mc Harg influential book (performative issues). Of course, as seen in the contributions collected in this Issue, a wide variety of decarbonisation measures have been dealt with along the workshops in Siena, Roma, Seville and Valletta, aligning the spatial planning discourse – Sustainability in the Space Domain – with the environmental one – Sustainability over Time – in order to meet the needs of the present without compromising the ability of future generations to meet their own needs (Fig. 1).

The point is to come to grips with the divide between the synthetic 'overall vision' of spatial planning and the metrics related to the environmental sciences depending on thresholds related to resource conservation/renewability (optimal and critical land use allocation, limits to air pollution, water and energy consumption).

Clearly the idea of a common path rooted on the concept of 'landscape', that has fully entered the administrative sphere, underpins on several milestones where disciplines should meet as a result from strong dialectics between planning and assessment traditions around the

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Torrino Mezzocammino, Roma
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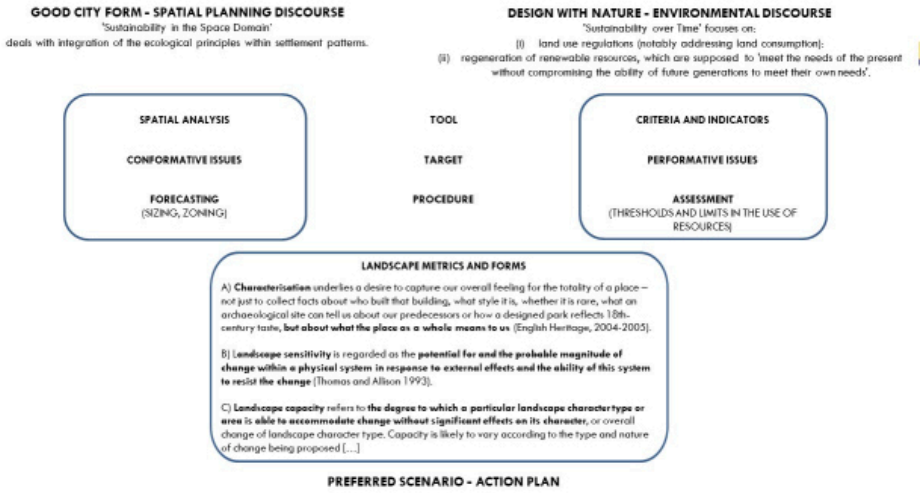

Figure 1 - Landscape on the move. Coupling spatial planning and environmental approaches

classical statement 'if…then'. In regional planning practice, the accent is placed on the latter (then, or rather the far future, reported on maps as a certain goal), whilst the environmental sciences look at the near future (if), approaching it step by step, taking into account possible alternative scenarios.
According to the European Landscape Convention, landscape has to be regarded as a common place for sharing opinions and visions to achieve 'landscape quality objectives'.
Landscape units are to be identified for the characterization process dealing with tangible and intangible assets and their relationships, values-in-use, in order to provide shared quality objectives, guidelines and operational issues (A).
Different 'predictory states' and corresponding scenarios related to variable pressure levels and configurations are to be assessed using both spatial analysis and environmental criteria and indicators (B, C).
Among different scenarios discussed within public bodies, practitioners, and community at large, the selected one is the best fitting with the expected requirements and performance.
Accordingly, policies and managerial tools are to be put in place in order to attain and secure environmental and social sustainability conditions, while action plans are called upon to define where transformations are avoided or are allowed under conditions.
Such process can be reshaped, if the case, according to the objectives to be fulfilled, following a pressure-state-response conceptual scheme largely adopted in the field of the environmental protection.

2. Concluding remarks

The environmental thinking is crucial in the renewal of planning paradigms, allowing for an iterative process (planning-by-doing). According to our experience, the implementation of Action Plans should be based on

several milestones allowing a good balance between form – certainty issues in attaining spatial rules – and and process – flexibility in attaining environmental goals according to ongoing assessment –, based on three conceptual steps: landscape characterization; sensitivity assessment; capacity assessment.
Concepts such as green infrastructure and ecosystem services lend themselves to such rationale.
In France, the so-called Démarche Grenelle de l'Environnement has been embodying ecological concepts within regional and urban planning. The 'trames vertes et bleues' (green and blue infrastructure) have been acknowledged as agro-ecological connections both in environmental policies and in urban and metropolitan governance schemes to counter fragmentation phenomena occurring at different scales. As a consequence, they are simultaneously 'secured' by the Environmental Code and the Urban Planning Code when it comes to biodiversity conservation and ecological continuity to be protected, restored or created (2012). More specifically, green infrastructure is currently taken into account in master plans through specific regulations as well as in the layout of open space, feeding the dialogue between environmental and morphological issues.
The notion of 'cultural ecosystem services' has also proven a promising field of interest, raising reflections upon the use of their mapping and assessment as a tool to investigate and support co-planning and co-managing environmentally and socially sensitive processes in the contemporary city. These approaches overcome the idea of planning as a mere issue of an a priori definition of rules. However, assessing landscape transformations over time is more than a quantitative operation, implying symbolic values, perceptive aspects, personal insights, that cannot be reduced to simple logic operations, and definitely requiring synthesis and strong management.

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Glossary

What follow are: the glossary of common terms that characterise the project and the more specific terms relating to the single teaching modules of each partner.
We sought to share with the reader the basic terms we used to build a common ground among partners with different backgrounds.

Common glossary

Carbon Accounting
Carbon Accounting refers to processes used to measure how much carbon dioxide equivalents an organization or a territory emits. It can be used by states, corporations, and individuals to create the carbon credit commodity traded on carbon markets.

Carbon Footprint
It is a parameter used to estimate the greenhouse gas emissions caused by a product, a service, an organization, an individual, or a territory, generally expressed in tons of CO2 equivalent (CO2 eq.).

Carbon Offset
A carbon offset is a reduction in emissions of carbon dioxide or other greenhouse gases made to compensate for emissions made elsewhere. Offsets are measured in tons of CO2 eq. and one ton of carbon offset represents the reduction of one ton of carbon dioxide or its equivalent in other greenhouse gases.

Climate Change
It 'refers to a change in the state of the climate that can be identified (...) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer' (IPCC, 2018).

Climate Change Adaptation
Process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2018).

Climate Change Mitigation
It is a "human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs)", including "human interventions to reduce the sources of other substances which may contribute directly or indirectly to limiting climate change" (IPCC, 2018).

Community engagement
Technical approach to directly involve local populations in all aspects of decision-making, implementation, and policy. Building on a participatory approach, community engagement strengthens local capacities, community structures, and local ownership to improve transparency, accountability,

On the left:
Rectorate of Roma Tre University, Roma
Credits: Anna Laura Palazzo

and optimal resource allocations across diverse settings (UNICEF, 2020).

Decarbonisation
Process aimed at reducing the amount of carbon in the atmosphere. This is done by both reducing greenhouse gas emissions and employing green infrastructures as a means to reach climate change mitigation. Sustainability aspects can be developed by means of energy, water, biodiversity, transport and planning solutions, which play an important role for climate change adaptation and mitigation.

Disaster risk reduction
An approach aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development (UNDDR).

Energy community
Community energy refers to a wide range of collective energy actions that involve citizens' participation in the energy system. Through the Clean energy for all Europeans package, the EU has introduced the concept of energy communities in its legislation, notably as citizen energy communities and renewable energy communities (EC, 2020).

Energy efficiency
Energy efficiency simply means using less energy to perform the same task – that is, eliminating energy waste. Energy efficiency brings a variety of benefits: reducing greenhouse gas emissions, reducing demand for energy imports, and lowering costs on a household and economy-wide level. There are enormous opportunities for efficiency improvements in every sector of the economy, whether it is buildings, transportation, industry, or energy generation (Environmental and Energy Study Institute-EESI).

Green infrastructure
Strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services – which represent the services and benefits that the natural environments provide to humans – in both rural and urban settings (EC, 2013).

Nature-based solutions
Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions (EC, 2015).

Prosumer
The term 'prosumer' in the energy field denotes consumers who both produce and consume electricity. They 'self-consume' some of the electricity they produce and sell the excess to the grid. When their production falls short, they also buy power from the grid, which makes them both producers and consumers (EPRS, 2016).

Risk
The probability that a natural (or human) event cause damage to society or the environment. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends

occur (IPCC, 2014). Components of risk are Hazard (natural or human event that can generate damage to society or the environment) and Vulnerability (the propensity or predisposition to be adversely affected).

Vulnerability
The propensity or predisposition to be adversely affected (IPCC, 2014). It is defined as Vulnerability = Exposure + Sensitivity – Adaptive capacity, where: Exposure means the presence of people, livelihoods, ecosystems, environmental services and resources, infrastructure, or economic, social, or cultural assets in places that could be adversely affected; Sensitivity regard the conditions in the exposed system that make it more likely to suffer damage and be adversely affected by a natural hazard; and Adaptive capacity concerns the characteristics and capacities of a system that allow it to deal with risk in the short term and those that are part of an ongoing process of learning and transformation in the long term (preparedness, prevention and mitigation).

Walkability
The extent to which the built environment is friendly to the presence of people living, shopping, visiting, enjoying or spending time in an area. Factors affecting walkability includes land use mix, residential density, presence of trees and vegetation, frequency and variety of buildings.

Climate change and natural hazards vulnerability

Adaptive Capacity
Those characteristics and capacities that allow a society to confront hazards while the natural phenomenon is happening (short-term response), and those that are part of an ongoing process of learning, experimentation and change in relation to the way these phenomena are confronted through preparedness, prevention and mitigation (long-term response).

Compound index
It is a simplified representation that seeks to summarize a multidimensional concept into a simple (one-dimensional) index based on an underlying conceptual model. It can be quantitative or qualitative according to the analyst's requirements (CEPAL, 2009).

Exposure
The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (IPCC, 2014).

Hazard
The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. In this report, the term hazard usually refers to climate related physical events or trends or their physical impacts (IPCC, 2014).

Indicator
An indicator is defined as a function of a variable, which measures a characteristic or attribute of the individuals under study (CEPAL, 2009).

Sensitivity
Those characteristics of the exposed elements that make them more susceptible to damage.

Variable
Phenomenon being studied, whose value in time and/or space varies (CEPAL, 2009).

Placemaking framework

15-minute city
The concept according to which people should be able to access urban services within 15 minutes by bike or on foot from where they live. It must have 4 key characteristics: proximity (services and people must be close to one another), diversity (there should be mixed uses), density (enough people to support diversity of businesses in an area), ubiquity (they should be common enough to be available to anyone) (www.15minutecity.com).

Placemaking
It refers to an integrated approach to planning, design and management of public spaces that exploit local knowledge and needs in order to improve the well-being and quality of life of communities (Schneekloth, 1995). Placemaking is a participative and collaborative process based on the enhancement of specific features of a place and the fulfilment of people needs for the improvement of the public space and liveability.

Town Planning
It encompasses the planning and design of all the new buildings, roads, and parks in a place in order to make them attractive and convenient for the people who live there.
(Collins Dictionary)

Urban Design
It applies to the design of towns and cities, streets, and spaces. It is the collaborative and multi-disciplinary process of shaping the physical setting for life - the art of making places. Urban design involves the design of buildings, groups of buildings, spaces, and landscapes,

and establishing frameworks and procedures that will deliver successful development by different people over time.
https://www.udg.org.uk/about/what-is-urban-design

Urban Regeneration
The term brings back underutilized assets and redistributes opportunities, increasing urban prosperity and quality of life. Urban regeneration initiatives are complex, lengthy and run the risk of gentrifying private space or privatize public one. [...] The shift of economic activities towards the outskirts of cities have left many inner-city areas blighted by unemployment, poor quality services, housing and decaying streets and public spaces. This has excluded residents from the opportunities of more prosperous districts and undermined the potential of urban centers to contribute to the prosperity of cities. Urban regeneration requires a diversity of approaches, such as redevelopment of brownfields, densification and intensification strategies, the diversification of economic activities, heritage preservation and reuse, public space reactivation and strengthening of service delivery.
(https://unhabitat.org/topic/urban-regeneration

Urban Carbon Accounting

Carbon Offset
A carbon offset is a reduction in emissions of carbon dioxide or other greenhouse gases made to compensate for emissions made elsewhere. Offsets are measured in tons of CO2 eq. and one ton of carbon offset represents the reduction of one ton of carbon dioxide or its equivalent in other greenhouse gases.

Conversion Factor
A conversion factor (CF) is a number used to change one set of units to another, by multiplying or dividing. When a conversion is necessary, the appropriate conversion factor to an equal value must be used. In this type of works, most of the CFs derive from the IPCC Guidelines and other international or national databases.

Equivalent Forestland
The equivalent forestland is the virtual area of land covered by a relatively young forest that would be needed to absorb an equivalent amount of CO2 emission of a given territory. An integrated set of CF mitigation measures and policies could be identified as possible initiatives to progressively decrease impacts and finally achieve a condition of the carbon neutrality of the study area (Pulselli et al., 2019b).

Greenhouse gas inventories
Greenhouse gas inventories are emission inventories of greenhouse gas emissions that are developed for several reasons. They are used to create atmospheric models, to develop strategies and policies for emissions reductions and to track the progress of those policies, establish compliance

records with allowable emission rates, and to better understand the sources and trends in emissions. Greenhouse gas inventories include not only emissions from source categories, but also removals by carbon sinks, like carbon storage in plants and ecosystems (IPCC, 2006).

"Pacman game"
Our 'Pacman game' is a reinterpretation of the popular video game, in which Pacman 'eats' squares representing hectares of forest equivalent needed to absorb the emissions of the study area. Each offsetting policy allows Pacman to continue his way, reducing the impact of the neighbourhood.

Energy Efficiency and Renewable Energy Self-Consumption for City Decarbonisation

Energy storage
Energy storage in the electricity system can be defined as the act of deferring an amount of the energy that was generated to the moment of use, either as final energy or converted into another energy carrier (EC, 2016).

European Green Deal
The European Green Deal is a set of policy initiatives by the European Commission with the overarching aim of making Europe climate neutral by 2050.

Micro-grid
A micro-grid can be defined as an independent power network that uses local, distributed energy resources to provide grid backup or off-grid power to meet local electricity needs.

NZEB building
Nearly zero-energy building (NZEB) means a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent from renewable sources, including sources produced on-site or nearby (EC, 2020).

Renewables self-consumer
'Renewables self-consumer' means a final customer operating within its premises located within confined boundaries who generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity (Interreg Europe, 2020).

Renovation Wave for Europe
Presents a strategy to trigger a Renovation Wave for Europe, breaking down long-standing barriers to energy and resource-efficient renovation, supporting fresh investment over a sustained period starting from public and less efficient buildings, spurring digitalisation and creating employment and growth opportunities across the renovation supply chain (EC, 2020).

NU3 - leNote di U3

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urbanisticatre.uniroma3.it/

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Teaching Decarbonisation

This issue of leNote di U3 brings together the results of the Erasmus+ project CITY MINDED.
It aims to promote learning opportunities in order to produce professional profiles that are able to pursue decarbonisation by conducting proper actions resolve environmental challenges, whilst ensuring a good quality of life for citizens.
The project involves five European partners - three Universities and two Energy Agencies: the lead partner, IRENA - Istrian Regional Energy Agency (HR); the Italian Universities of Roma Tre – Department of Architecture and Siena - Department of Earth, Environmental, and Physical Sciences (IT); the University 'Pablo de Olavide' - Department of Geography (ES); and the Malta Intelligent Energy Management Agency (MT).
This publication is a unique opportunity to share the knowledge on how the workshops were structured and conducted, particularly in the situation when the activities had to be adapted to the pandemic, as was the case in Siena, Rome and Seville. The workshop in Malta was carried out in person, so this provides the opportunity for a comparison.

NU3 - leNote di U3

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