InCLIMATE

Integrating Climate Resilience in EU Higher Education

BOOK OF PROCEEDINGS

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InCLIMATE
Integrating Climate Resilience in EU Higher Education

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Integrating Climate Resilience in EU Higher Education
INCLIMATE PROJECT FINAL CONFERENCE

Edited by

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Roma Tre University

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INTEGRATING CLIMATE RESILIENCE IN EU HIGHER EDUCATION

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FOREWORD

Adapting to climate change will become a necessary step for reducing the vulnerability of many regions across the globe.

Resilience of towns and territories is strongly influenced by the effectiveness of land-use planning. Spatial settlement patterns are a critical factor in the interaction among urbanization, climate related risks, and vulnerability (5th Assessment Report of the Intergovernmental Panel on Climate Change).

Today, important international strategies concentrate on the need of readdressing urban and public policies to climate adaptation and mitigation, such as the EU Adaptation Strategy and Mayor Adapt, aiming at making Europe more climate-resilient, and the UN COP 21, aiming to achieve a legally binding and universal agreement on climate, with the purpose of keeping global warming below 2°C.

Despite the efforts to mainstream climate change concerns into local planning, governance and policy making practices, these issues are but little embedded into the higher education curricula of professionals that are mostly engaged in the planning process, as planners, architects, engineers, decision makers, as well as economists and sociologists. Moreover, adaptation and resilience cannot be treated without considering other challenges faced by EU territories: a multidisciplinary approach is therefore crucial to enable future professionals to deal with these issues and identify appropriate measures and responses.

The Erasmus+ projects represent a crucial opportunity to foster such approach and to enhance methodologies dealing with the complexity of our built environment.

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GENERAL OVERVIEW

The InCLIMATE project in a nutshell

Marios Trigkas, InCLIMATE Project Coordinator, Aristotle University of Thessaloniki (GR)

Keywords: Inclimate project, climate resilience, higher education ERASMUS+

Aim of the InCLIMATE project

By focusing on urban resilience, InCLIMATE project (Integrating Climate Resilience in EU Higher Education – http://inclimate.eu), addresses one of the new priorities of the Erasmus Program and one of the most urgent topics in the EU, where most countries are dealing with climate risk management issues but lack a holistic and common approach to resilience.

The project aims to take on the challenge by increasing HEI staff's and students' interdisciplinary skills through the development of innovative educational approaches to planning and allied disciplines to rise to the challenge posed by Climate Change. Furthermore, it aims to bring the challenge within the core of urban governance, by directly and indirectly training professionals and officers to shape resilient policies. To attain these goals, the project proposes an alternation of desk activities and workshops targeting both teaching staff and students, aimed at the collective production, development, sharing, testing and dissemination of Open Educational Resources (OERs), based on the use of collaborative Concept Maps.

InCLIMATE activities

During these two years of implementation of InCLIMATE project the following were achieved:

- Training of lecturers/trainers/researchers on project topics, methodology and tools, promoting a holistic approach to climate resilience (taking into consideration spatial, environmental and technological aspects), the use of OERs as part of the regular teaching and training practice, and the use of concept mapping as an effective method to transfer meaningful, interdisciplinary knowledge on climate resilience topics.

- Testing of the project methodology at partner level, with the involvement of around 400 students in partner universities and public officers, trained by partners on the use of concept maps for climate resilience planning and policy design.

- Involvement of 40 approx. students of different academic backgrounds in an intensive course/workshop based on concept mapping and interdisciplinary group work, where students were encouraged to break the barriers of their disciplines and learn to build a shared knowledge and cooperate for the sake of climate adaptation. The Intensive course represented a model of collaborative educational experience – a laboratory for interdisciplinary and cross-fertilizing collaboration among lecturers and students that can be replicated in other courses, faculties and HEIs in partner countries and beyond.

- Production of OERs on climate resilience based on concept mapping, organized in modular courses and made freely available on the project e-learning platform.

Project results

Project outputs will challenge the complex and interconnecting issues related to urban resilience and contribute to transfer resilience concepts into operational capacities in local government, civil society and professional communities.

The project is expected to primarily benefit HE students, who – within a stimulating learning environment - will acquire interdisciplinary knowledge and skills in the fields of climate resilience, which in the medium-to-long term could result in more opportunities for research or employment and better professional placement in the public and private sectors.

Project Identity

The partners of InCLIMATE project were closely collaborated these two years and established fruitful and constructive cooperation on the project's topics and aims. The consortium is constituted by:

- Aristotle University of Thessaloniki from Greece as the coordinator
- Malta Intelligent Energy from Malta
- Universitatea De Architectura Si Urbanism Ion Mincu from Romania
- Universidad Pablo De Olavide from Spain
- Oxford Brookes University from United Kingdom
- Università Degli Studi Roma Tre from Italy

The project started at 1/10/2020 and will end at 31/12/2022. It was funded ERASMUS+ - Call 2020 Round 1, KA2 - Cooperation for innovation and the exchange of good practices, KA203 - Strategic Partnerships for higher education.

FRAMING URBAN RESILIENCE

Tracking urban adaptation in a warming Europe

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Keywords: extreme heat events, urban adaptation, implementation, risk reduction, heat waves

Extreme Heat Events (EHE) are a major concern for many urban areas worldwide and are considered as one of the deadliest natural hazards globally. The EU-funded project U-ADAPT! (Urban-Adaptation) focuses on the concrete expression of adaptation to evaluate the current implementation and effectiveness of adaptation measures and strategies to reduce Heat Disaster Risk (HDR), moving the emphasis from the study of vulnerability, resilience, and potential adaptation (adaptation capacity) of communities to the actual depth and pace of the past and current adaptation process. In this communication we discuss the theoretical support and design of the project and introduce the framework as a heuristic analytical tool for understanding, explaining, and developing local adaptation to extreme heat conditions.

The U-ADAPT! framework was developed in an iterative process building on existing scholarly debates, on administrative adaptation plans, and on participatory consultation with community stakeholders as a prior step to develop an indicator to ground-test adaptation in European Union's urban areas. The framework is structured across five different adaptation goals in relation with five different domains: (i) UHI effect, (ii) EHE exposure, (iii) EHE sensitivity, (iv) EHE coping capacity, (v) EHE adaptive capacity. These goals are in turn unfolded into twenty-two adaptation objectives, each of one extensively described and illustrated through a collection of specific adaptation measures or strategies. Results of an evaluation carried out among urban resilience officers from EU cities and academic experts on climate adaptation will be shown as well as next stages of the project.

Building multi-dimensional resilience for cities through blue-green infrastructure development

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Keywords: blue-green infrastructure, resilience, multi-dimensional

Following climate change, cities are affected by extreme weather phenomena that, together with the aggressive urbanisation process, have serious repercussions on the physical and mental health of the population. Also, the effects of the safety methods that had to be taken during the covid19 pandemic based on self-isolation led to the worsening of psychological and social problems within the communities, especially cases of depression caused by nervousness and concentration problems, these being amplified by the neural activity of life in the urban setting.

Currently, cities are facing the phenomenon of over-densification of the grey matrix as a result of the aggressive urbanisation process, especially following the waves that occurred in the late 90s and early 2000s when the main concern was the development of the real estate market. This has attacked green and natural spaces, which have been observed over time to have a quantifiable economic impact that benefits society in the urban setting, but also being among the main methods of increasing climate and ecological resilience and recovery of the social and environmental dimension of cities.

The green-blue infrastructures represent "systems within systems" made up of point elements (green spaces) and linear connection elements (blue and green axes) at different scales of the city: macro, mezzo and micro. They represent a method of connecting fragmented spaces in the city, from landscape elements, hubs and cores of activities to structural and morphological elements, but also a method of combating the negative effects registered on a global scale. The methods of approaching and integrating BGI in the urban context are different and vary according to the character of cities, these can be important systems and elements in increasing the competitiveness

and connectivity of the city; interconnected, multifunctional systems that define the character of adjacent communities; or a method of city adaptability to the different issues caused by global phenomena like heath islands or floods.

Recently, it has become one of the main approaches at the macro-territorial level, based on the exploitation of watercourses within the urban environment and their naturalisation, combining them with green infrastructure elements and using new modern water capture and management technologies for optimal use of the resource. This new approach deals with transforming blue infrastructure elements from their utilitarian functions of drainage and storage into focal points for recreation and creating an inclusive and diverse range of activities for communities, bringing them closer to the water.

The impact is major within the urban context which influences several sectors, being an optimal approach in terms of natural disasters; effects in the social environment; effects on the ecological infrastructure, biodiversity and natural habitats, branches neglected in the past in the urban environment, but which represent a priority in the present and the future; giving a view to a good sustainable development and the survival of cities, especially in a post-pandemic society.

The premise is to show how blue-green infrastructures can be an optimal instrument to combat the effects on a global scale that affect the urban environment in the current urban context. This is to be determined with the role of green and blue elements in cities, so that they are perceived as more than just parks and water areas, and to show their double importance in the current urban framework: the importance of the interconnectivity of spaces and accessibility to them in order to transform the city in a climate and ecologically resilient one; and sustainable and resilient recovery following the covid19 pandemic in order to reduce the effects on the mental health of the population by promoting the social and environmental dimensions.

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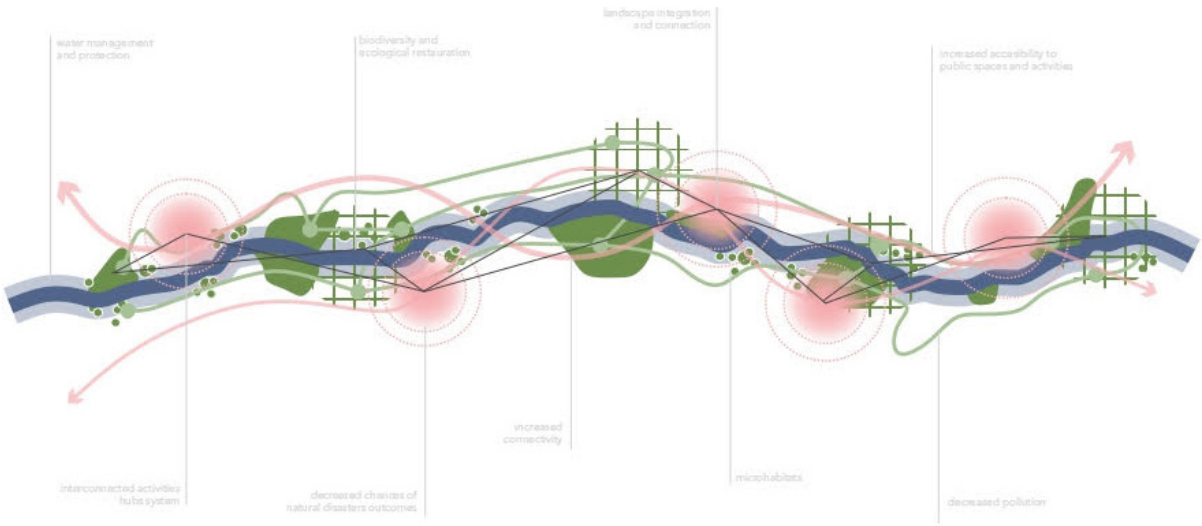

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Climate change and sustainable water management. The NAWAMED project

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Keywords: Greywater (GW), Green walls, water scarcity, nature-based solutions (NBS); Non-Conventional Water (NCW)

The NAWAMED project solutions for addressing water scarcity

NAWAMED project aims to change conventional urban water management practices by promoting sustainable and decentralised treatment technologies, replacing potable water with good quality of Non-Conventional Water (NCW). The project, funded by the ENI CBC MED programme, foresees the implementation of real scale pilot installations; training workshops for technical staff and decision-makers; local and Mediterranean 'Water tables' aimed at boosting new policies for a more sustainable water management. The countries where the project tests and demonstrates low-cost nature-based solutions (NBS) are Italy, Tunisia, Jordan, and Lebanon. According to the IPCC forecasts, climate change will increase drought risk in Mediterranean countries, reducing water availability and strengthening environmental pressure. The use of NCW resources (rain and recycled water) for non-potable domestic uses is highly recommended by scientists and international agencies to face the growing demand and water scarcity.

The most promising approach to domestic NCW use considers decentralised solutions, not requiring expensive infrastructures. In urban areas, natural solutions developed vertically can be proposed, recovering walls not in use, thus contributing to the achievement of other objectives such as building aesthetics, mitigation of the heat island effect, increasing biodiversity, etc. Nonetheless, maintaining vertical gardens' benefits requires considerable water for irrigation. How to provide irrigation water in water scarcity contexts? The solutions tested in NAWAMED couple the advantages of GW separation and reuse, above all, its low contaminants level and the fact that the demand for recycled water can be easily linked to the production capacity, with the

advantages of vertical gardens. Process-wise, the greywater treatment technique derives from the constructed wetlands technology. The green wall is a vertical vegetated structure with various plant growth patterns (Bustami et al., 2018).

In the NAWAMED pilot plants, we use (i) "modular tray" containers and (ii) indirect green facades, maximising the quantity of the filling media, which supports the growth of the bacterial biofilm responsible for 90% of removal of pollutants. (i) Greenwalls with pot modules: although the solution is innovative and many of the experiences available to date are still on a pilot scale in the laboratory under controlled conditions (e.g., Boano et al., 2020; Fowdar, 2017; Prodanovic, 2018), technologic innovation is proceeding rapidly, leading to already having several full-scale applications reported in the literature (Masi et al. 2016 and Zraunig et al. 2019). (ii) Green facades: this solution dramatically decreases the investment cost compared to the treated flow rate of living walls; indeed, it is a vertical flow constructed wetland (CW) planted with ornamental and climbing plants. The solution is highly innovative, and the suitability for greywater treatment and climbing plants' survival was recently successfully reported from Greek experiments (Kotsia et al., 2020). The first finalised NAWAMED pilot plant is in a school building in Ferla, Sicily. The wall uses the modular tray solution and covers a surface of 30 m2 treating up to 1,3 m3 per day. Based on initial estimations, the solution will reduce about 20-25% of the water consumption in the school.

The use of green walls for the treatment of grey water involves a double advantage: (i) reducing water and the energy footprint of green walls currently used in architecture, (ii) generating potentially reusable waters for non-potable uses (e.g., refilling of the toilet flush cisterns, green areas irrigation, yard cleaning). Due to these advantages, green walls are considered among the most promising green architecture solutions capable of combining the need for wastewater treatment and recovery and the acceptance by residents of the inclusion of decentralised treatment solutions in urban environments (Liu, 2017).

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IMPROVING TEACHING PRACTICES ON URBAN RESILIENCE

The InCLIMATE experience

The Climate resilience database as a tool to support HE on Urban resilience

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Keywords: blue-green infrastructure, resilience, multi-dimensional

The Climate Resilience Database (CRD) is an instrument which was worked at the beginning of the InClimate project. All the partners joined forces to build a strong basis for supporting Higher Education Institutes (HEIs) in issues like climate change adaptation, urban resilience, and the environment. The database systematizes knowledge on the state of the art of climate change adaptation and resilience.

It collects and organizes resources on these issues, makes them freely available for students and researchers as a basis for research and planning, and creates a repository for learners to easily access relevant data and information on the project topics during and after the project. The challenge of the CRD was to bring together scientists from different disciplines and countries to contribute harmoniously for common indicators and data needs. After several discussions with the partners, Aristotle University of Thessaloniki, as the lead organization responsible for the CRD, established several guidelines that were administered to all partners for supporting its objectives. The main common sections of CRD for all partners are Climate Change Institutional Framework, Climate Resilience Instruments, Thematic networks, and Financial Opportunities. It is believed that with the CRD tool will be very useful after the end of InClimate project for students and researchers of HEIs.

The InCLIMATE e-learning platform

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Keywords: eLearning, training tools, educational material, open-source platform

The field of electronic learning (or "eLearning") has gained increasing popularity during the past decade. Additionally, the COVID-19 pandemic, during which the InCLIMATE project started, has contributed significantly to the increased interest in the use of eLearning and online training tools, since to reduce the spread of the virus, education institutions were forced to switch to eLearning using available educational platforms.

eLearning platforms are integrated sets of interactive online services that provide trainers and learners with information, tools and resources which can support training delivery as well as course content and resources management. An eLearning platform has been developed as part of Intellectual Output O3 of the InCLIMATE project, funded under the Erasmus+ programme.

The platform, which was launched in July 2021, is linked through to the project main website and is directly accessible from the homepage or through http://elearning.inclimate.eu/. The main objective of the platform is to serve as a repository of outputs and material produced during the project as well as after its conclusion. The eLearning platform includes interdisciplinary educational materials on climate resilience, climate change, environmental management, energy efficiency and renewable energy, environmental impact on urban areas and urban policies.

The platform is based on the Modular Object-Oriented Dynamic Learning Environment – Moodle, a free and open-source software learning management system. Moodle represents one of the most widely used open-source e-learning platforms, that enables the creation of a course website with access to enrolled students. The platform has been designed to be easily managed and updated with relevant information about the project's activities and results and to be

accessible by different levels of users. The virtual environment enables the organisation of material in different work areas with multiple functionalities, supporting courses, participative and collaborative activities, shared didactic contents and tests. The platform is also equipped with a specific search filter, to facilitate a quick and effective search for the requested resources and several tools and plugins are available which can be further integrated and used according to the type of material included in the online courses.

The use of an eLearning environment has several advantages such as increased access, improved quality of learning, better preparation of students for a knowledge-based society and "lifelong" learning opportunities. It provides flexibility in terms of time and place since learning content is available in short modules that can be followed intermittently depending on the users' requirements. Additionally, the resources are available to all users anywhere since the only requirements to access the content is an internet connection and a user account and eLearning packages can also be adapted to the individual learner. It is foreseen that the InCLIMATE eLearning platform also serves as a place for interaction within a continuous educational programme and thus registered users will be able to upload their own materials, and to enrich the existing ones with additional data.

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Testing a method to put inter-disciplinarity into practice

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Keywords: Climate change, Inter and Transdisciplinary, Cognitive map, Knowledge exchange, Knowledge Integration

Inter and transdisciplinary approaches are critical components to systematically address climate change and urban resilience (Kirby, 2019). Potential solutions require thinking differently. However, traditional teaching and learning approaches within the built environment sector remain based on disciplinary silos, while innovative approaches remain confined within the boundaries of extra-curricular activities (Adams 2018).

Therefore, future professionals are required to be more equipped with advanced technical skills in order to deliver sustainability. However, one of the main difficulties in putting Inter and transdisciplinary approaches into practice is the lack of dedicated teaching and learning materials (Sibilla and Kurul, 2020). Regarding this gap, this contribution illustrates one of the outputs of the InClimate project focused on developing a Pre-Ordinated-Cognitive-Structure (POCS) dedicated to the topic of climate change and urban resilience. In detail, it describes the methodology adopted to develop a flexible cognitive tool and its use to stimulate knowledge integration and exchange.

The approach was based on a combined use of Constructive Grounded Theory (Charmaz, 2014) and Case Study Method (Seawright and Gerring, 2008) in order to collect relevant content for the POCS from multi-level perspectives. The application of scientometric and world frequency analysis were also tested in order to automatise the procedure of gathering information when a large groups of stakeholders are involved. In addition, a Cognitive Mapping Technique in Novakian style (Novak and Cañas, 2004) was used to graphically represent relevant concepts and connections. Novak's approach starts with the definition of a focal question (i.e. What concepts characterise climate change and urban resilience issues from your point of your?).

Concepts that form the answer are ordered in terms of their importance. Phrases which connect the concepts are added and labelled. Concepts are presented as hierarchies with general concepts at the top, and specific concepts at lower levels. Each concept has a specific role, each relation explains such role, and the sequences of connections define a meaningful discourse related to the focus question. Therefore, the hierarchical organization visualises the thought process through which the focal question has been answered.

This cognitive structure is considered to be a sound base for developing Meaningful Learning Activities (MLAs) in order to to manipulate, articulate and discuss the concept and relationships introduced by the POCS. It was adopt Jonassen MLAs classification (Jonassen and Strobel, 2006): observant and manipulative; constructive and reflective; intentional; complex and contextual; collaborative and conversational. "Intentional activity" can be associated with the subject's competencies. Hence, it refers to the ability to construct a sequence of focal questions which reflect the thought process. This process allows user to visualise pieces of knowledge and thus it facilitates the knowledge exchange and integration.

As a result, the POCS is an ontology about climate change; it is not a simple map of it. In fact, it includes domains of knowledge (i.e. that represent relevant focus questions) and proposes a preliminary series of connections among concepts, building meaningful discourses on climate change and urban resilience from multi-perspective views. The scope is to facilitate orientation, comprehension and modelling of complex themes, developing verbal and non-verbal communication abilities. The combined use of different methodology and tool is offered as a robust methodological apparatus able to support single or groups of trainers to elaborate and explore specific interdisciplinary topics in HE. Therefore, the approach proposed is also discussed as an opportunity to integrate inter and transdisciplinary approaches into curricular programmes. The POCS has been disseminated as an Open Educational Resource.

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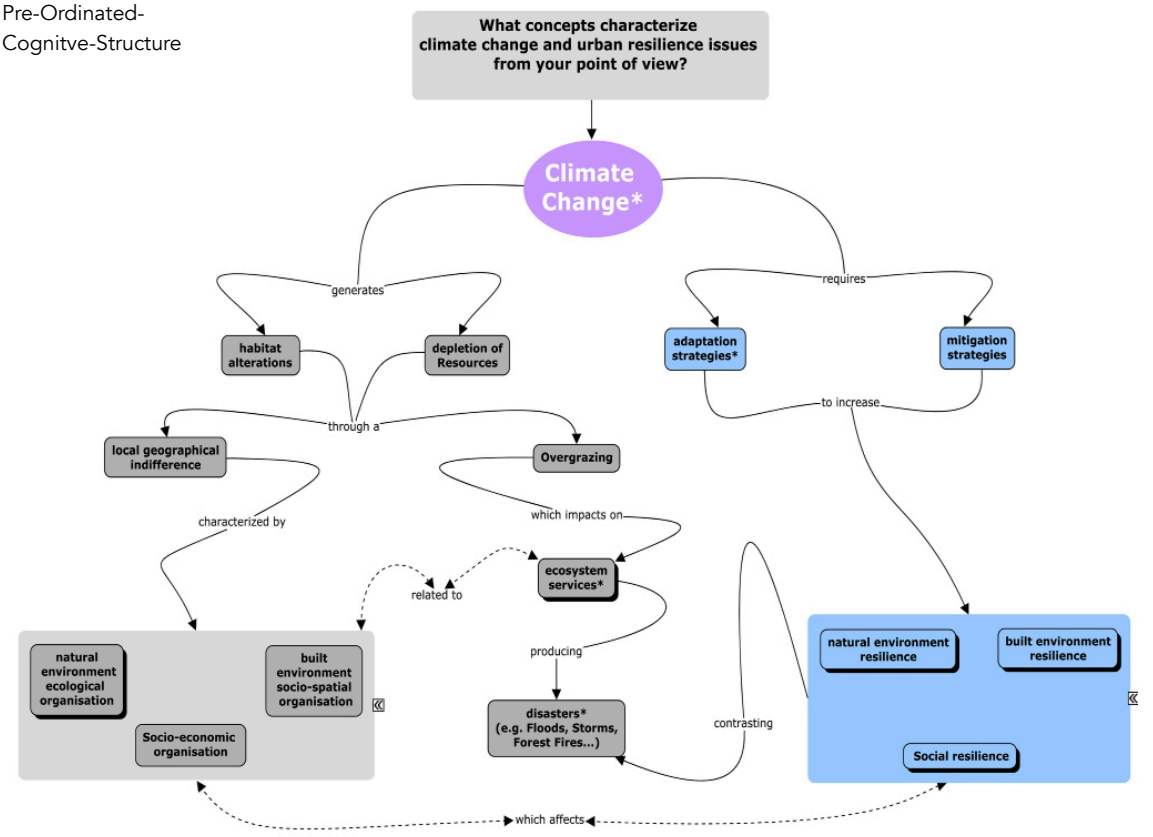
Fig.1: InClimate: Pre-Ordinated-Cognitve-Structure



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Climate resilience approaches in urban planning education

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Keywords: concept map, adaptation and mitigation strategies, collaborative workshops

The concept of resilience has been mostly linked, in urban planning, to the vulnerability of cities to climate change effects. The complexity of climate resilience approaches in urban planning is highlighted by the diversity of elements (infrastructure systems, ecosystems, institutions, agent capacities) that need to be considered in mitigation and adaptation strategies. As a result of this growing vulnerability of cities, urban planning needs to overcome the challenge of integrating, theoretically and in practice, new concerns related to resilience, while addressing each of its thematic components (infrastructures, ecosystems, urban structure and morphology, urban mobility, etc.).

In the academic sector, new, appropriate methods and tools for teaching and learning how cities' resilience to climate change can be planned and designed are to be experimented

In this context, the use of concept maps in urban planning education represents an opportunity for devising teaching experiences that enable students to connect different concepts and bodies of knowledge, regardless of their experience or background. Our contribution illustrates an approach of realizing an integrated concept map on climate resilience, using different phases of integration. Starting from the Pre-Ordinated Cognitive Structure Map developed in the InCLIMATE project, we have proposed a methodology for integrating the results of educational activities organized in five universities using

climate resilience concept maps. The integration was realized during collaborative workshops between the teachers involved, which aimed to eliminate the overlaps between different concepts and connections and to solve inconsistencies by appealing to information from scientific papers or policy documents.

The Climate Resilience Integrated Concept Map reviewed all of the concept maps realized in the five universities and integrated all aspects focusing on climate adaptation and mitigation strategies, linking them with the need to increase resilience in the natural environment, the built environment and the social and economic environment. Better resilience can be supported by the legislative framework, consisting of rules and regulations, as well as policies and programmes which can be implemented with the aid of various financing instruments. The funds that can be used for climate change resilience are European, national or regional funds, through different programmes such as: LIFE+ programme, Horizon Europe, INTERREG etc. These financing instruments can encourage the application of principles and models: reducing the carbon footprint, restoring nature, circular economy, integrated risk management, digitalization etc.

The implementation of these principles and models is aided by PLANNING, DESIGN AND MANAGEMENT PRACTICES, namely the spatial planning, urban design and management monitoring. These practices refer to instruments and practices at different spatial scales, containing the planning documents and documentations specific to each national planning system. Spatial planning is applied to various spatial dimensions which need to be approached in the context of climate resilience: technical infrastructure, social infrastructure, blue-green infrastructure, housing, economic spaces and mobility and transport. Nevertheless, all of the already well studied concepts and well-known instruments should improve and encourage adopting various TECHNICAL SOLUTIONS such as: green buildings, sustainable urban mobility, river restoration, eco neighbourhoods, recycling and re-using waste, stormwater management etc.

This final map showcases the possibilities offered by the climate resilience concept map as an educational instrument for students in both bachelor and master degrees, with specializations ranging from urban planning and geography to architecture and forestry engineering.

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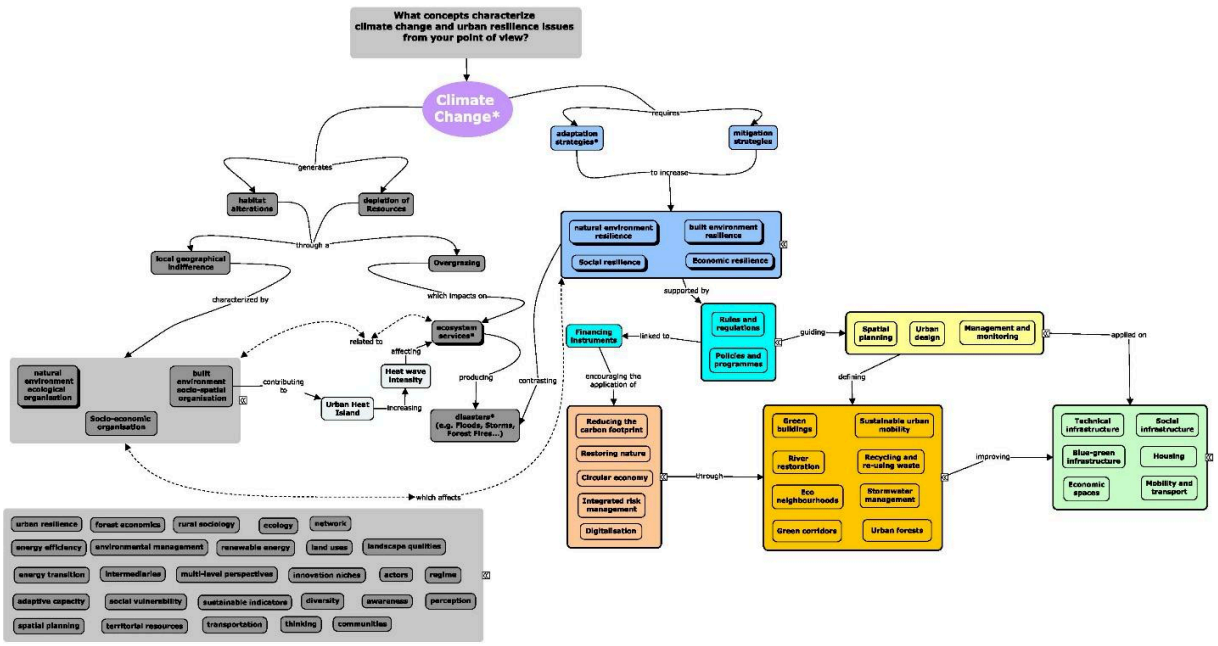

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InCLIMATE educational activities: the Intensive course in Malta

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Keywords: Cognitive Maps, C-Map tools, Climate resilience, Educational activities, Multi-disciplinary approach

One of the educational activities implemented by the ERASMUS+ project InCLIMATE "Integrating climate resilience in EU higher education" was the Intensive Course held in Valletta (Malta) from May 23rd to May 26th 2022, hosted by the project partner MIEMA (Malta Intelligent Energy Management Agency).

The aim of the Intensive Course was to test the Climate Resilience Integrated Cognitive Maps (CMs) tool [Eden, 1992] to frame the issues of adaptation and resilience to climate change by fostering interaction among students of different universities (Roma Tre University, Ion Mincu University of Bucharest, Aristotle University of Thessaloniki and Oxford Brookes University), disciplinary backgrounds (Architecture, Urban planning, Forestry and Natural Environment) and academic levels (23 Undergraduate and Master students; 4 Ph.D. students).

The educational experience consisted in two main phases: the first one included lectures held by partners regarding method and climate change-related topics, followed by a second phase of multi-step practical activity, where the students interacted in groups.

The first lecture, held by Maurizio Sibilia (OBU-United Kingdom), introduced the method that would be applied in the following activities: the Cognitive Mapping Technique. The following lecture, held by Federica Di Pietrantonio (UNIROMA3-Italy), presented CmapTools, an open-source software that enables its users to construct and share Concept Maps.

The other lectures, held by university partners, presented their perspectives regarding climate changes resilience and adaptation:

- Roma Tre University, represented by Lorenzo Barbieri, analysed how climate resilience is integrated in urban planning and policies across Italy;
- Maurizio Sibilia (OBU-United Kingdom) held a lecture titled "Co-evolution of Energy Infrastructure and Settlements", summing up the topics of the course held at OBU;
- Mihaela Negulescu and Serin Geambazu (UAUIM-Romania), presented how adaptation and climate resilience is integrated within the teaching activities in the Urban Mobility masters programme;
- Yago Martí (UPO-Spain) introduced U-ADAPT!, a project aimed to evaluate the implementation and effectiveness of adaptation strategies and measures to reduce "Heat Disaster Risk";
- Representing Aristotle University of Thessaloniki, Marios Trigkas and Konstantinos Papaspyropoulos gave an insight on how climate resilience and adaptation to climate changes are dealt with in the fields of Agriculture and Forestry.

Lastly, Diane Cassar (MIEMA-Malta) presented mitigation and adaptation strategies developed by MIEMA for the state of Malta.

The various expertises in the educational activities were combined in the second phase of the Intensive Course, by dividing the students into work-groups. In the first part, the groups shared a list of concepts, which were - according to their own experience - fundamental to the knowledge of climate resilience in urban contexts. The exchange and integration of different approaches then constituted the following part, through a process of linking concepts, eventually expressed in a Pre-ordinated Concept Maps. In this sense, the main activity of the group work, and of the Concept Maps in general, was to identify the focus question to which the shared prior knowledge could provide an

answer in terms of policies, processes, strategies, and interventions. Eventually, the group work ended with finding an answer to the focus question: "What concepts characterise climate change and urban resilience issues from your point of view?". Starting from a predefined framework, it was possible to modify and integrate its concepts and linking processes, demonstrating the adaptive capacity that the Concept Maps tool displays in providing complex and alternative answers to common questions.

The Intensive Course described in this contribution demonstrates that multidisciplinary profiles are highly efficient in complex-problem solving fields. In this sense, at the end of the educational activity, a discussion phase took place regarding the product of the group work previously considered. The Intensive Course demonstrated - according also to literature - that Concept Maps is a tool that had a positive effect on the process of student learning [Kinchin, 2014] and higher education [Mahler et al., 1991]. The Concept Maps tool was fundamental to transform abstract multi-disciplinary knowledge into visual representations [Hay et al., 2008]; therefore, the discussion phase was crucial for possible next developments ideas and/or future projects.

Future programs could investigate the applications of Concept Maps, in a broader way the multi-disciplinary frame, starting from Intensive Course of Malta results, and equalising quantitatively and qualitatively the study levels of the students involved.

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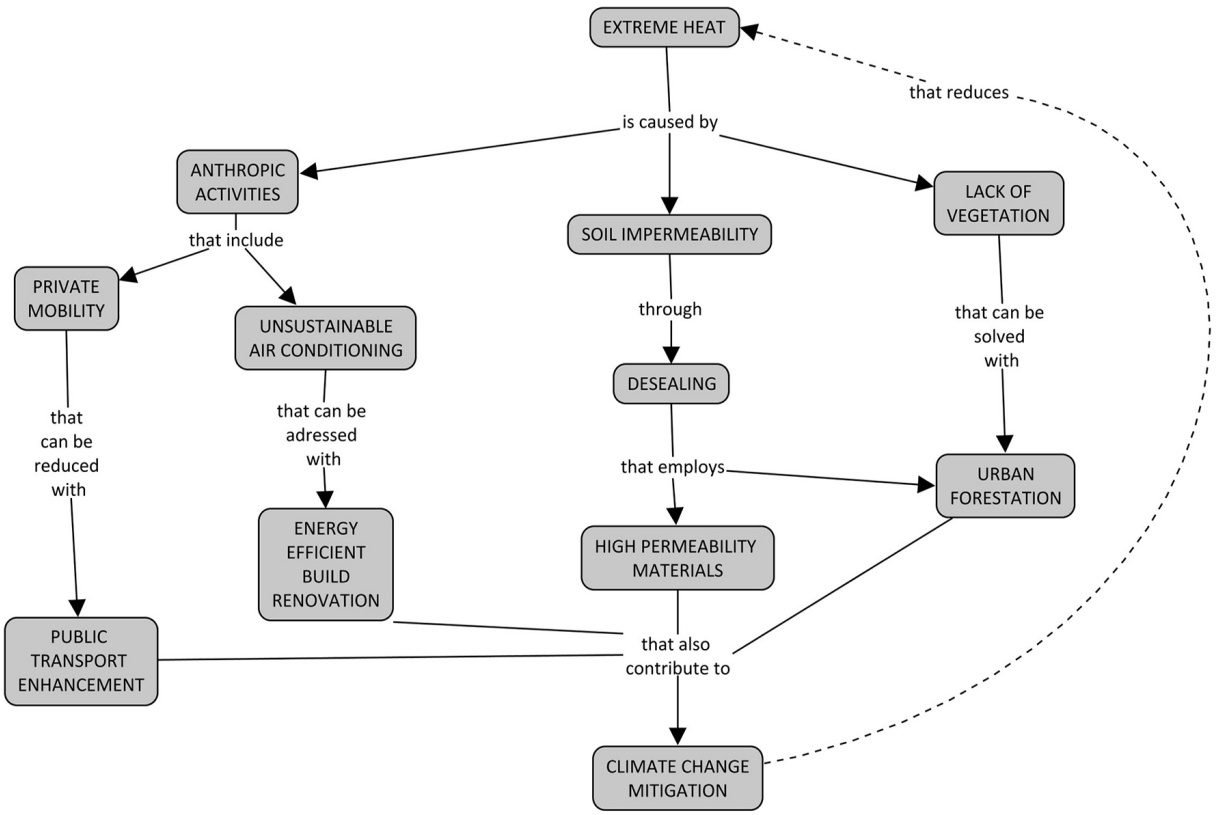
Fig. 1. A concept map developed by the students during the group work session (elaboration of the authors using CmapTools).



IMPROVING TEACHING PRACTICES ON URBAN RESILIENCE

International experiences

The CITY MINDED project: urban sustainability, decarbonisation and climate change

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Keywords: urban sustainability, decarbonisation, climate change

Sustainability of cities is currently a key challenge in Europe. 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. The aim to ensure a sustainable urban environment is a crucial task for all the actors. Cities are leading Europe's economy and are key players in Europe's transition towards a low-carbon economy. 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. Decarbonisation measures concern a wide variety of topics: policies and communication strategies for raising citizens awareness and prompting behavioral changes, solutions for energy savings in households/buildings (such as building envelope retrofitting or more efficient technologies, e.g. for heating/cooling systems), renewable energy generation at the building scale (e.g. PV panels, wind turbines, geothermal heat pumps, biofuels) and at the neighborhood/district scale (heat grids, electric smart grids), sustainable mobility systems (e.g. bike sharing, integrated public transport, electric vehicles), urban waste management, as well as participative urban design practices and legal-economic advices (e.g. for collective ownerships of renewables and private-public partnerships). This requires a systemic interdisciplinary approach that is currently not widespread in the higher education, but looks necessary to let new professional profiles emerge, able to coordinate different source of information, stakeholders and practitioners (e.g., urban designers, energy managers, etc.). 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. 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, 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.

Climate change and health in urban areas. The CLICCHE project

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Keywords: Higher Education; Urban Planning and Design; Climate change; Urban Health; Community participation

The concept of "urban health" and the role of urban design in the quality promotion of the cities' living spaces has been present in the international debate for some decades, but only since the publication of the "New Urban Agenda" (WHO 2016), health has been defined as "one of the most effective markers of any city's sustainable development". The pandemic emergency we are experiencing imposes a more compelling reflection on the relationship between health and the city, and on the role of university research and education to understand what the city of the future will and should be like. However, a gap between education, scientific research, and professional practice hinders the achievement of a seamless collaboration among the different stakeholders involved in the urban regeneration of our cities.

CliCCHE, an Erasmus+ Project (Action Type KA220-HED - Cooperation partnerships in higher education) aims at developing and testing newer non-formal learning/teaching experiences that aim to stimulate students' motivation, enhance their engagement, and amplify their contribution to generating a participative environment.

The CliCCHE educational methodology and tools will be developed seamlessly with the contribution and involvement of representative groups of citizens, professionals, and public administrations. CliCCHE has been designed to achieve the following objectives:

- allowing students to evaluate climate change effects on urban health and equity and so to identify and design appropriate adaptation strategies;
- increasing the student's interest in the topic of urban regeneration through an innovative participatory process (urban simulation game);

- innovating the teaching activities by applying a transdisciplinary approach, and involving citizens through immersive virtual environments, simulation games, and public art;
- promoting changes in the public administration (municipalities) and providing knowledge and tools, which could develop health-oriented climate-proof urban plans and projects;
- raising citizens' awareness of climate change effects on health in an urban context and strengthening their role as co-designers of urban spaces.

These non-formal learning tools will be adopted to identify and define climate change adaptation strategies at the urban scale. Since the produced educational methodology and tools will be finalized by a European consortium (University of Camerino; The Cyprus Institute; University Institute of Lisbon ISCTE; CNR IFT and UNIVERZITET U BEOGRADU) and integrated into the educational offer, it will be possible to transfer it in other EU countries. The activities and results of the project are the following:

R1- Research on mitigation and adaptation strategies of climate change effects on human health in urban areas (R1). It is the preliminary document aimed at identifying case studies, examples, research, and projects on the relationship between climate change and urban health;

R2- Health urban planning Teaching Methodological Guidelines. It aims at understanding the importance of planning and urban design to mitigate the effects of climate change on health (thermal stress, cardiovascular diseases, kidney disease, food insecurity, also increased mortality from the spread of viruses, the effects of natural catastrophic events, etc.).

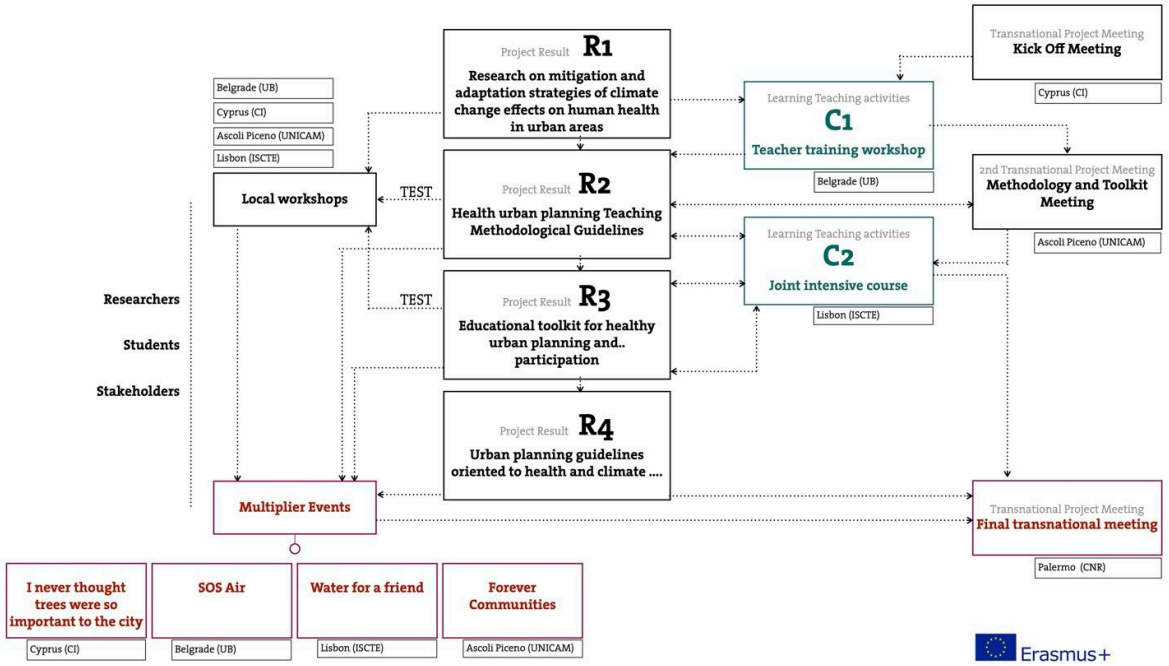
R3- Educational toolkit on healthy urban planning: it is a tool aimed at transferring and applying the methodology developed in R1 and R; R2 and R3 will be applied and tested through a series of local workshops

at the partner level, with students and the input of stakeholders and citizens.

R4 Urban planning guidelines oriented to health and climate change mitigation practices. This result involves the elaboration of a checklist that will help universities and public administrations to better define and evaluate urban policies.

The methodological framework and the tools used will be disseminated through mainstreaming activities such as different channels and communication tools and through specific events "the Multiplier events".

Fig.1.Diagram of CliCCHE's workflow.



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The Solar Decathlon lesson for a smart citizenship

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Keywords: energy efficiency, digitalization, education

We are going through a period of strong change, a crisis whose solution is identified in the transitions, ecological and digital, taking place. The combination of ecological objectives and digital tools in architecture opens scenarios not yet fully explored, but potentially harbingers of important results.

The Solar Decathlon competition gives us a lesson on how to deal with the energy and digital revolutions in the construction sector, in which IT tools can be considered a shared culture that fosters the exchange and interaction between different disciplines, with the goal of environmental quality, energy efficiency and the well-being of the inhabitants. It is an international competition, established by the United States Department of Energy in 2002 in Washington DC. Since then, the competition moved to Madrid, Los Angeles, Beijing, Versailles, Colombia, Morocco, Dubai, Budapest, with many hundred thousand people involved, thanks also to the important communication and social awareness activity that teams, and organizations are required to develop.

Each edition involves 20 multidisciplinary teams selected internationally and led by universities. Teams are required to design, engineer, build and run zero energy residential prototypes, powered by the sun, assembled in 10 days in a Solar Village, a small smart city, based on IoT. A full set of sensors is installed in every competing house and sensors are all connected to a centralized data-logger, transmitting real-time performance data (comfort and energy balance) over the web. Every team is required to simulate the tasks of daily home use, according to a competition calendar that establishes what is to be accomplished daily, leaving it up to the teams to decide how and when to combine these activities, such as laundry, showers, and cooking. Hence, user behaviour becomes one of the parameters influencing the result of

the performance, and therefore of the competition ranking. In fact, it is our firm belief that building energy efficiency does not end with construction. The largest part of energy savings is achieved by placing people at the center of managing the entire life cycle of the building. In the Solar Village, in each edition of the competition, a local server is combined with a network of wireless sensors connected to all types of devices.

This not only ensures remote control, allowing switching on, off and adjustment, but also transfers the data to a remote server, online, where you get an integrated view of the home network, in which the connection between devices normally considered separate becomes indispensable. The role of users in managing its operation and use is fundamental: in the competition, it influences the final ranking, allowing you to acquire points, but, more importantly, in real life it generates the desired comfort and the consequent consumption or energy savings.

The data system produced by the houses, if made available on the web with social networking technologies and integrated into the smart city, could trigger a comparison between different users and, gradually, the sharing of data between buildings, then neighborhoods and finally different areas of the city or the country itself, triggering a process of healthy and educational competition. This approach belongs to gamification, a research field that can effectively be used to encourage energy-saving behaviors in the inhabitants of the home, condominium, neighborhood, and city. This would develop a serious and innovative game to promote the reduction of energy consumption and carbon emissions, modifying the behavior of citizens, who are left free to decide their own usage strategy, even making mistakes.

So, although smart infrastructures have helped to facilitate the creation of smart and comfortable buildings, people are still the protagonists of the urban drama and, if committed, those responsible for its possible redemption.

Fig.1.The winning Solar Decathlon project "Rhome", 2014

| INTERDISCIPLINARY AND MULTI-LEVEL PERSPECTIVES TO TACKLE CLIMATE CHALLENGES

CoNECT. Networks for Everyday Community Resilience

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Keywords: Resilience, adaptation, ecological transition, urban laboratories, local communities.

CoNECT, Collective Networks for Everyday Community Resilience and Ecological Transition, cuts across research, innovation and implementation, linking approaches to resilience from the social, economic, and environmental perspectives, into a circular reflection between the local and the global.

In the context of the economic and environmental crisis, urban decision makers need to address numerous global challenges (Climate Change, social and economic inequality, natural resources depletion etc), and take action towards increasing resilience and facilitating ecological transition. The 'resilience imperative' (Lewis & Conaty, 2012) has now been fully recognised by international policy as evidenced in the recent frameworks (eg. European Green Deal, Habitat III, COP21, World Urban Forum). However, to build resilience requires a multi-level and multisectoral approach, and it is necessary to engage the direct participation of both individuals and the whole-of-society (MacKinnon & Derickson, 2013; The Young Foundation. 2012).

CoNECT focuses on the mechanisms of setting up spaces and practices of everyday resilience at the neighbourhood scale, through these complex partnerships, required to scale up and enhance the transformational agency of local civic dynamics for ecological transition.

The project brings together a research consortium of partners (and self- or non-funded supporting entities) with expertise in innovative multi-actors collaboration and mutual learning environments between professionals of the built environment, inhabitants, administrations and other public entities like housing agencies or cultural institutions.

CoNECT aims to catalyse existing social networks for collective action in six European Union countries (Romania, Spain, France, Norway, the Netherlands and Sweden), aiming to boost community organising capacity by recognising, mapping, connecting and strengthening everyday practices of community resilience that also drive ecological transition. More specifically: 1: Spaces and practices of everyday community resilience - mapping and organizing across different EU contexts; 2: Comparative analysis - co-producing transnational and transdisciplinary research on resources, partnership models, and stakeholder networks; 3: Experimental frameworks - enhancing places and initiatives of civic resilience through collaborations between professionals, researchers and community; 4: Scalability of Innovation - co-producing and delivering knowledge in a manner that is widely accessible to everybody, no matter their professional background; organising relevant meetings (through a digital platform) to connect local networks and enhance transformational agency of civic resilience through knowledge sharing across the six participating countries.

It fosters collaboration between citizens, thinkers, doers and planners from the partner countries, who will co-design and conduct synergistic urban laboratories (CoNECT Labs), jointly implementing innovative tools and methodologies. The immediate target groups of the project are linked to using place as a cross-connector of multiple stakeholders. The Labs are place sensitive and the comprehensive mapping of spaces and practices of resilience ensures that the actions are relevant case by case. On another level this local agenda and the Urban capacity building – communication, collaboration and decision making – can counter the problem of fragmentation in cities between the many and often disconnected actors and stakeholders. This is a way of renewing

the traditional participatory methods in a way that not only is more bottom-up but also more focused on developing new opportunities (and ways to solve local problems) than reacting to new planning from above. This is extremely important in the frame of the New Leipzig Charter, which states that "cities and urban systems need flexibility as well as the ability to respond to external disruptive events and chronic stress [and] the robustness of cities to cope with changing framework conditions should be supported by an ability to learn from past events and from each other..." and in the current shift in resilience approaches which, rather than mitigation, focus on communities' adaptive capacity and potential for collective learning and acting together. The citizen-driven innovative transformation of spaces is considered a key driver for the implementation of co-resilience strategies, enabling the emergence of 'caring communities' (Schalk et al, 2019, Power and Williams, 2020).

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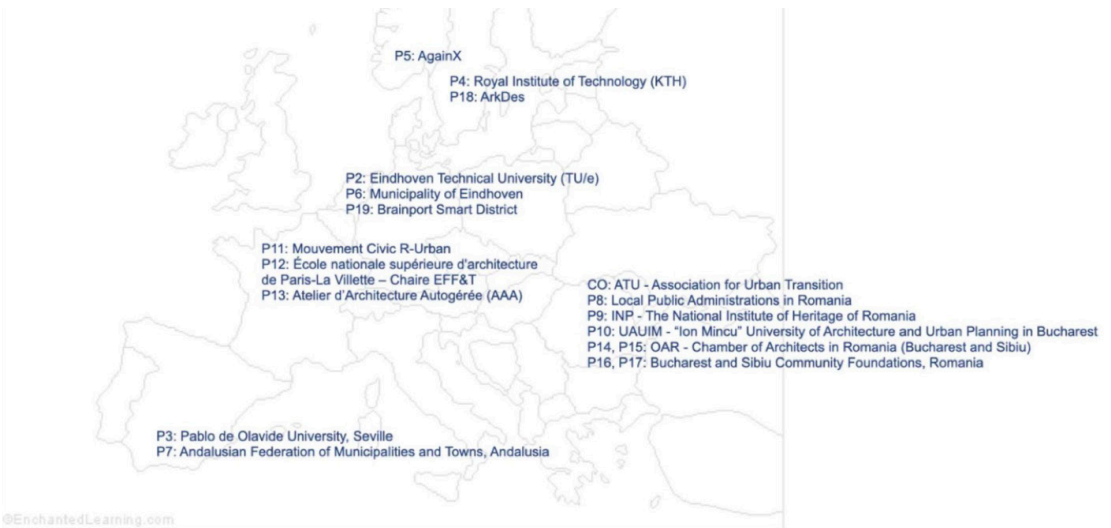
Fig.1. CoNECT partnership map



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Nature-based Solutions for climate adaptation

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Keywords: Climate Change, Resilience, Risk Management, Thermal Comfort, Urban Heat Island

Introduction

This contribution outlines the general impacts and direct consequences climate change is producing in urban areas, especially in terms of negative influence on thermal comfort and flooding, and how Nature-based Solutions can increase our climate-adaptive capacity and reduce the various health and economic risks associated with urban heatwaves and soil sealing.

The study focuses on urban microclimate and discusses key challenges for successful implementation of integrated design solutions at different scales for climate change adaptation. Through the illustration of an experimental case studies the author investigates the microclimatic impacts of different environmental design strategies, showing in particular the effectiveness of combined landscape technologies, levering on vegetation and soil permeability to mitigate the urban microclimate, as well as improving the outdoor thermal comfort.

Managing the Urban Climate through Nature-based Solutions

Urban climate has been widely investigated in the last decades, especially studying phenomena of increase or decrease in air temperature between urban and rural areas, defined, respectively, as urban heat/cool island effect (Ng 2010; Morris et al. 2016). Unsustainable urbanization is ongoing, the climate is changing, and European cities are predicted to be exposed, more and more in the next years, to multiple climate hazards.

According to the literature, several design strategies exist to mitigate the effect of urban heat island (UHI) and cool island effect (Yang et al. 2016), by manipulating the urban energy balance. In this frame,

the urban design plays a major role in the adaptation to the extreme climatic events (Santamouris 2007). An adaptive urban design should aim at balancing the environmental energy fluxes affecting the city, through bioclimatic strategies, integrated at different scales within the urban context (Olgyay 1962; Givoni 1969), for example, (i) varying the albedo (the ratio of irradiance reflected to the irradiance received by a surface) to reduce net radiation, (ii) improving the ventilation affecting human heat load, and (iii) augmenting the evaporative and shading potential.

Nature-based solutions are actions to protect, sustainably manage, or restore natural ecosystems, that address societal challenges such as climate change, human health, food and water security, and disaster risk reduction effectively and adaptively, simultaneously providing human well-being and biodiversity benefits. For example, a common problem is the flooding in coastal areas that occurs as a result of storm surges and coastal erosion. This challenge, traditionally tackled with manmade (grey) infrastructure such as sea walls or dikes, can also be addressed by actions that take advantage of ecosystem services such as tree planting. Nature-based solutions play a key role in climate change adaptation and building resilience in urban areas and communities. They are a cost-effective way of addressing climate change while also addressing biodiversity and land degradation (World Bank, 2022).

Nature-based Solutions – especially trees and vegetated surfaces – have proven to be effective in producing positive effects on the outdoor thermal comfort (Akbari et al. 2001; Picot 2004; Bowler et al. 2010), being able to absorb the solar radiation impinging the city surfaces, and mitigating the adverse climatic conditions by radiative cooling. A city comprises thousands of microclimates, which vary as a function of its design, and physical properties. Within this context, it is evident that each area of the city is part of a heterogeneous balance and as such should be designed and optimized, being interconnected to the entire city.

In order to mainstream Nature-based Solutions, it is useful to underline

the importance of redesigning the open space and the architecture of abandoned as well developing urban areas, as an opportunity to mitigate the urban microclimatic conditions and improve overall quality of life of the urbanites.

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Fig.1. Nature-based Solutions at Sankt Jakob, Copenhagen. Photo credits: Maria Beatrice Andreucci

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Challenges for integrating climate resilience approaches in the Romanian national planning system - The need for interdisciplinary collaboration

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Keywords: territorial and urban planning instruments, cooperation between specialists, reforms and investments

The importance of climate resilience is increasing on the public agenda in Romania. The territorial and urban planning instruments as well as building design and construction regulations are facing new challenges. Both the legislation and the professional practices must be renewed/ updated on the basis of a different paradigm.

The sustainable development goals, assumed both at international and national level through sustainable development strategies need to be implemented by interdisciplinary teams (especially UN SDG 11 - Make cities and human settlements inclusive, safe, resilient and sustainable' and UN SDG 13 - Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy).

Also, the OECD is investigating how cities can increase their resilience. According to OECD, Resilient cities are cities that have the ability to absorb, recover and prepare for future shocks (economic, environmental, social & institutional). Resilient cities promote sustainable development, well-being and inclusive growth.

The deep understanding of the problems that is required by spatial planning and urban design for climate resilience needs to be based on solid cooperation between specialists in various fields of knowledge. The solutions can only be identified through co-working between architects, urban planners, environmental specialists, landscape designers, hydrological engineers, etc.

Recently, important steps have been taken to introduce the climate change topic in the planning Romanian legislation - and an intersectoral analyse will be introduce in order to substantiate the vision and the proposals (both in terms of regulations - regulatory frames, as well as investment plans - operational frames) of the general urban plans - PUGs.

However, the analysis of some examples of this type of studies is showing a quite formal approach. Sometimes, the study takes the format of an essay on generalities when a really useful study with a clear local diagnosis and specific measures would be needed. Also, the evaluation of some studies presented in the National Commission for Territorial Development, demonstrates that there is not enough dialogue among specialists from different sectors. The integration of the specific results of these studies is rarely demonstrated. Sometimes, the plans are not made by a team formed by specialists with various backgrounds and the climate change topic is treated formally by architects with no particular studies or by consultancy firms also without sound experience.

Currently, the Romanian government is working on updating both the legislation and the methodologies and the planning practices, commitments being made and supported also by the National Resilience and Recovery Plan reforms and investments. These reforms should be accompanied by a reflection and update of the educational curricula so that young professionals become more aware of the climate change adaptation and mitigation framework in which they will have to operate.

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Legambiente for Energy Communities

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Keywords: Energy Communities; Renewable Energy; Energy Transition; Climate Justice; Social Justice

The ongoing energy crisis, the resulting high utility bills and the climate emergency require Europe and Italy to urgently find concrete and lasting solutions. Among these are energy communities which are legal entities that allow citizens, companies, cooperatives, non-profits, local administrations, schools, and universities to come together to locally consume and share self-generated electricity and thermal energy from plants powered by renewable sources. Within an energy community, producer and consumer become one entity, the prosumer, and each member becomes an active participant in the energy monitoring and management.

This results in economic benefits, thanks to government incentives that reward shared energy in these configurations; social benefits, starting with the fight against energy poverty; and environmental benefits, thanks to the use of renewable energy. On the economic match, energy communities can contribute to an average savings for the electricity bill of up to 25%, with the understanding that each energy community can structure its technological compartment (installed power, storage systems, smartgrids, etc.) to aim for much higher percentages.

Since 2020, Legambiente's aim is to ensure that as many energy communities as possible are built in Italy, with a priority focus on contexts with critical socioeconomic issues. To achieve this goal, the association is carrying out numerous activities at many levels:

- Promotion & Support - Legambiente promotes and participates in events on the topic, does communication through social channels and traditional media, drafts guides for the implementation of energy communities, and assists local governments in writing calls for applications to access public funding (BeCome campaign and Bando Aree Sisma).

- Connection & Facilitation - The national energy office receives daily requests for support in the implementation of energy communities, which are also turned over to the regional and local presidia that can offer close assistance. In addition, Legambiente provides a bridge for dialogue among citizens, government, companies, and non-profits capable of quickly concretizing collaborations.
- Organization & Implementation - Legambiente is directly involved in the implementation of energy communities through the activities of the Renewable and Solidarity Energy Communities Network, the "Zero In CO(2)ndotta" campaign, and directly, through the work of regional and local presidia as with Renewable and Solidarity Energy Communities in East Naples and Critaro.
- Awareness Raising & Training - Legambiente is constantly engaged in awareness-raising and education activities aimed at explaining the proper consumption of energy produced by renewable energy plants and promoting a culture of energy saving at home. In addition, it organizes trainings aimed at national offices, regional and local presidia so that there is the dissemination of skills on energy communities, especially in relation to the operational tools that enable their concrete implementation.
- Dialogue with Decision Makers & Stakeholders - The inclusion of the energy communities introduced by the European REDII Directive within Article 42-bis of the Decreto Milleproroghe is the result of the dialogue and work carried out by Legambiente with Parliamentary groups that have shown themselves to be sensitive and interested in the issue. In addition, Legambiente continuously dialogues with stakeholders in the energy communities so that the most relevant experiences and instances are collected to be reported to political society and regulatory authorities aimed at the constant improvement of procedures and regulations.
- Control & Complaint - Legambiente is engaged in the control of laws and regulations that are promulgated both at the national

and local levels by indicating, during the public consultation phase, the elements of perfectibility. Latest example, the comments sent to ARERA on Resolution 390/2022/R/EEL. It also oversees the operational aspects related to the implementation of energy communities to ensure that they reach the end of the implementation process, reporting situations where there are delays, defaults and unjustified blockages by authorities and operators.

A Climate Resilient Built Environment in the UK

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Keywords: built environment, systems thinking

The Intergovernmental Panel on Climate Change (IPCC) published The Mitigation of Climate Change (CC) Report in April 2022. This report was clear that the time for action to limit global warming is now. It follows the recognition of the 2020s as the critical, decisive decade for the world to avert the worst impacts of climate change. It also identifies the continued increase in total net anthropogenic GHG emissions and the cumulative net CO2 emissions since 1850 during the period 2010–2019. An increasing share of these emissions can be attributed to urban areas, despite the consistent expansion of policies and laws addressing mitigation.

Therefore, cities and other urban areas are consistently included among the four spheres of action in high profile reports that call for action (OECD, no date). In fact, cities and urban areas are part of both the solution and the problem. For example, cities generate 60% of the Global GDP and 70% of the GHG emissions (UN, 2015), as such they offer significant opportunities for emissions reductions. Some advocate "a peaceful revolution" for these reductions to be delivered.

This presentation will begin by highlighting the impact of the built environment sector in the UK, and the opportunities it offers to avert CC. It will characterise "a peaceful revolution" in the built environment, which goes beyond individual organisations mitigating their negative environmental and social impacts to fundamentally rethinking the design, delivery and operation of the buildings; and their locked-in legacies for decades after their inception. It will argue that a complete shift from the current practices in silos to collective performance accountability is urgently required. It will conclude by illustrating how collaboration across organisational and disciplinary boundaries, and Systems Thinking (Senge, 1990) can expedite this shift, and identifying key areas of research in order to ensure that Every practitioner

and occupant is part of a 'peaceful revolution' to minimise the built environment's contribution to the Climate Crisis and to enhance the social value it delivers. They accept their collective accountability for its life-time performance.

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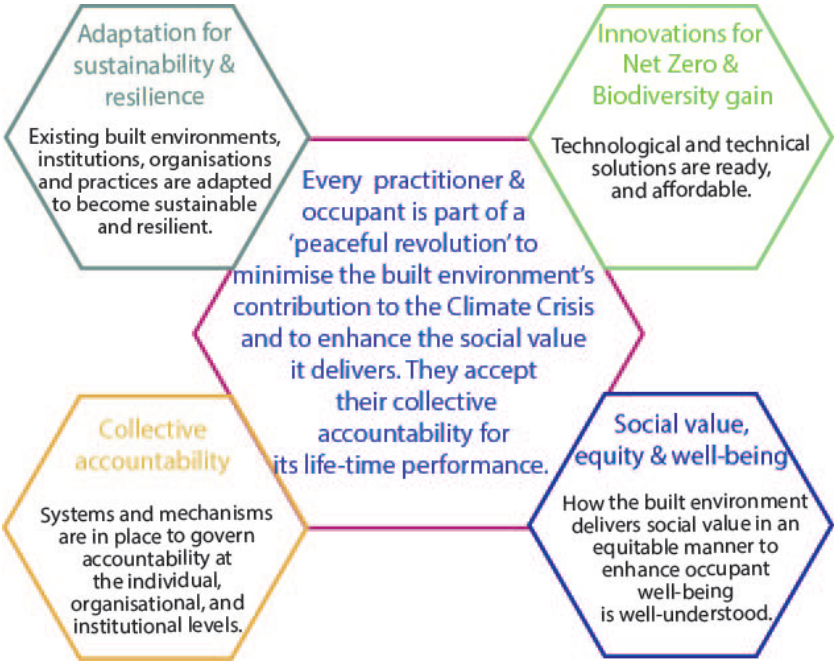

CROSS-FERTILISATION IN DOCTORAL RESEARCH – ONGOING EXPERIENCES

Cultural Ecosystem Services mapping and assessment: Perspectives for the use of Cognitive Maps in community engagement

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Keywords: Cognitive Maps, Cultural Ecosystem Services, Community Engagement

The Millennium Ecosystem Assessment (MEA) defined Ecosystem Services (ES) as the benefits that people obtain from ecosystems. Specifically, they are contributions of ecosystem structure and function to human well-being and are classified into four categories i) provisioning (food, materials, and energy, which are directly used by people;), ii) regulating (e.g., of atmospheric gases, climate, water cycle), iii) supporting (e.g., nutrient cycle, pollination, habitat and hydrological cycles), and iv) cultural.

Green Infrastructure, understood as socio-ecological connections with multifunctional value (Davies et al., 2006), are strategic spaces for providing ES in urban and peri-urban areas, and are particularly significant for delivering Cultural Ecosystem Services (CES) through the interaction between green spaces and the social or cultural practices that take place there.

MEA defines CES as the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences, including cultural diversity, spiritual values, knowledge systems, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage values, recreation, and ecotourism.

Currently, the mapping and assessment of CES remains relatively neglected and poorly understood compared to that of SE. This limitation could be explained, in part, by the peculiar characteristics of many CES, which are non-material, intangible, and invisible compared to other SE (Cheng et al., 2019).

The research "Greening Green Infrastructure. Landscape and Ecological Continuity in the Metropolitan City of Rome" fits into this gap and intends to explore innovative and effective methodologies for CES mapping and assessment that take into account both the environmental and social contexts. The research includes also an application of the identified techniques in peri-urban areas of the Metropolitan City of Rome, intending to raise reflections upon the use of CES mapping and assessment as a tool to investigate and drive the transformation of the contemporary city.

The main methods of CES mapping and assessment focus on taking information by people's perceptions (e.g., of local communities, tourists, or farmers) through interviews, questionnaires, social media data analysis (e.g., Flickr and Instagram images), participatory mapping (e.g., also digitized using GIS systems), stakeholder meetings (e.g., thematic tables, focus groups, participatory SWOT analysis).

Accordingly, it is possible to hypothesize the use of Cognitive Maps – maps in which "concepts" may be mono- or bi-polar encouraging to look for a "relationship" in the ideas – as tools to facilitate the involvement of communities in the mapping of ES and CES in particular, enhancing the role of key actors and, at the same time, integrating local knowledge with expert knowledge.

For example, evidence of the benefit of using Fuzzy Cognitive Maps – maps in which the relations between "concepts" can be used to compute the strength of impact of these elements – for local community engagement is reported in Ecuador, where experts and members of local communities co-designed a map developing a decision-making framework to identify what affects water quality and potential strategies and policies to improve its conditions (Fonseca et al., 2022). Additionally, the use of Fuzzy Cognitive Maps as a practical tool to elicit subjective views on resilience mechanisms and illustrate the methodology in co-production with professionals from the wastewater sector in Belfast, shows that this participatory approach is reflective (capturing reflections of practitioners in a discussion),

inclusive (including internal and external participants with diverse responsibilities) and integrated (enabling to account for feedbacks to and from other departments and in interrelation to a larger urban resource) (Tepes et al., 2020).

In conclusion, Cognitive Maps allow to detect the knowledge, experience, and beliefs of participants about the functioning of a specific system to make such implicit assumptions (or mental models) explicit (Jetter and Kok, 2014). It is, therefore, possible to state that, due to its methodological structure, Cognitive Maps could be a supporting tool for community engagement in CES mapping and assessment to explore i) the "concepts": e.g., the types of CES, benefits, practices, actors involved, ii) the "relationships": the dynamics, conflicts, and variables arising from human-ecosystem interactions that are found to influence the delivery of CES, as well as the analysis of trade-offs and synergies.

practitioners (e.g., urban designers, energy managers, etc.). The lack of such type of processional profiles was the trigger to prepare the project CITY MINDED – City Monitoring and Integrated Design

Fig.1. Example of Cultural Ecosystem Services in the Grand Parc Miribel Jonage in Lyon, August 2019 (Author Romina D'Ascanio)

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Concept maps: a possible compass for confused researchers

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Keywords: InCLIMATE, Concept maps, INTERREG Programmes, sustainability, climate resilience

The use of concept maps promoted by the InCLIMATE project has proved a powerful tool for orienting a research project dealing with multiple and intertwined macro-themes, since it has helped focusing and structuring the research path and selecting relevant information to define, and respond to, the research questions posed. The research that is being carried out within the doctoral course "Landscapes of the contemporary city. Techniques, policies and visual studies" of Roma Tre University - Department of Architecture, intends to investigate how coastal cities on the European shore of the Mediterranean have used INTERREG European territorial cooperation programmes (notably in the period 2014-2020) to address the challenges posed by climate change. The research has the final aim to identify the main gaps to be filled, and to provide insights and good practices for the definition of new, and more incisive, mitigation and adaptation projects.

Coastal cities in Mediterranean Europe are considered particularly vulnerable to climate change effects, but at the same time, they appear as less "resilient" and "sustainable" than those in central and northern Europe, despite the fact that numerous EU projects on environmental and climate-related topics have been implemented in their territories. It is therefore worth investigating what is and has been the role of INTERREG projects on environment and climate in the sustainable transformation policies of these cities, what specific aspects of coastal urban areas in the Mediterranean have been addressed so far and with what effects (if any) on urban environments, and, last but not least, how the role of these projects can be strengthened, in terms of effectiveness and visibility of results.

Until now, evaluation experiences have often focused either on purely quantitative aspects, or on very specific and/or territorially

circumscribed case studies. The research intends, instead, to start from the coastal location as a crosscutting criterion, to map the overlapping of INTERREG projects (funded under a variety of Programmes but sharing environmental and climate themes), and to carry out a quali-quantitative and multi-scalar analysis able to detect their physical impacts (both actual and potential) on the cities under consideration.

Especially in the starting phase, this kind of research poses significant difficulties regarding the identification of the specific focus of the study, and the subsequent selection of relevant information and of a consistent "interpretation path". Indeed, the research touches a variety of macro-themes, such as the evolution of European climate change policies, the transformation of interregional cooperation over time (in terms of geographical scope, priorities, governance and fund allocation) and its relationship with EU spatial planning policies, as well as more general, methodological issues, i.e. how to define urban sustainability and resilience, evaluate territorial impacts of EU projects, etc.

Orienting within the plethora of literature on these themes can prove quite challenging for the unexperienced researcher, who struggles to point out the relevant sources and concepts, trace a logical "route" able to connect them, and identify the specific knowledge gap to fill in. The concept mapping approach proposed by InCLIMATE can provide valuable support in this sense: resulting from an evolution process conducted along several previous Erasmus+ projects (EHCmap, E-RESPLAN, ENEPLAN), it helps systematizing knowledge, building a meaningful discourse and "prune away the dead wood", focusing the scope of the research without pretending to be exhaustive and all-embracing.

Therefore, the main outcome of the practical application of c-maps within InCLIMATE can be summarized as an increased ability to select (sources, information, themes to address, ways and tools to address them), to unassumingly confront complexity and find a personal way to contribute to its unravelling.

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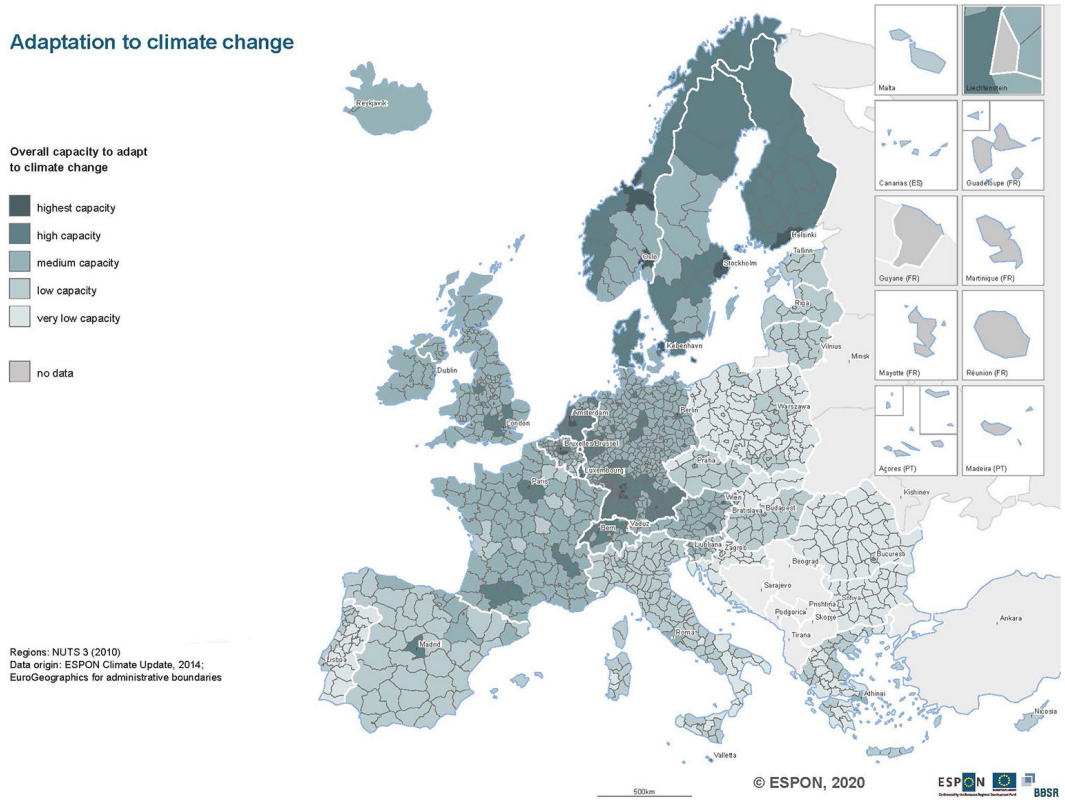

Fig.1. Climate change adaptation capacity of NUTS3 regions in Europe ESPON, 2014

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Open Educational Resources (OER) as a key to collaborative research. The experience of the InCLIMATE intensive course applied to territorial rebalance policies.

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Keywords: Open data, InCLIMATE, Concept maps, Inner Areas, territoriale rebalance policies

In the last United Nations Climate Change Conference in 2021 (Conference of the Parties 26 - COP26), the participating States signed the "Glasgow Climate Pact" revising and sealing the 2015 "Paris Agreement" (COP21). In particular, the conference reinforced the importance of five key dynamics for the achievement of the goals set: these include Collaboration, in all its forms.

The partnership realised for the InCLIMATE project, completely reflects the meaning of collaboration required by COP26. In this sense, the intensive course organised in Valletta (Malta) from 23 to 27 May 2022 answers the need for cross contamination between Universities, Agencies and Public Administrations. More specifically, the partnership members experimented the use of Climate Resilience Integrated Cognitive Maps (CMaps) as an implementation of urban resilience to climate change.

The methodological approach used in the intensive course and the objectives set by the InCLIMATE project, represent an important reference for the development of the doctoral research presented at the end of this abstract, highlighting the need to increase the sharing of critical issues and solutions among the authorities in charge of territorial policies.

The experience of the InCLIMATE intensive course took place as a doctoral student of the Department of Architecture of Roma Tre University, and prompted the responsibility of implementing climate

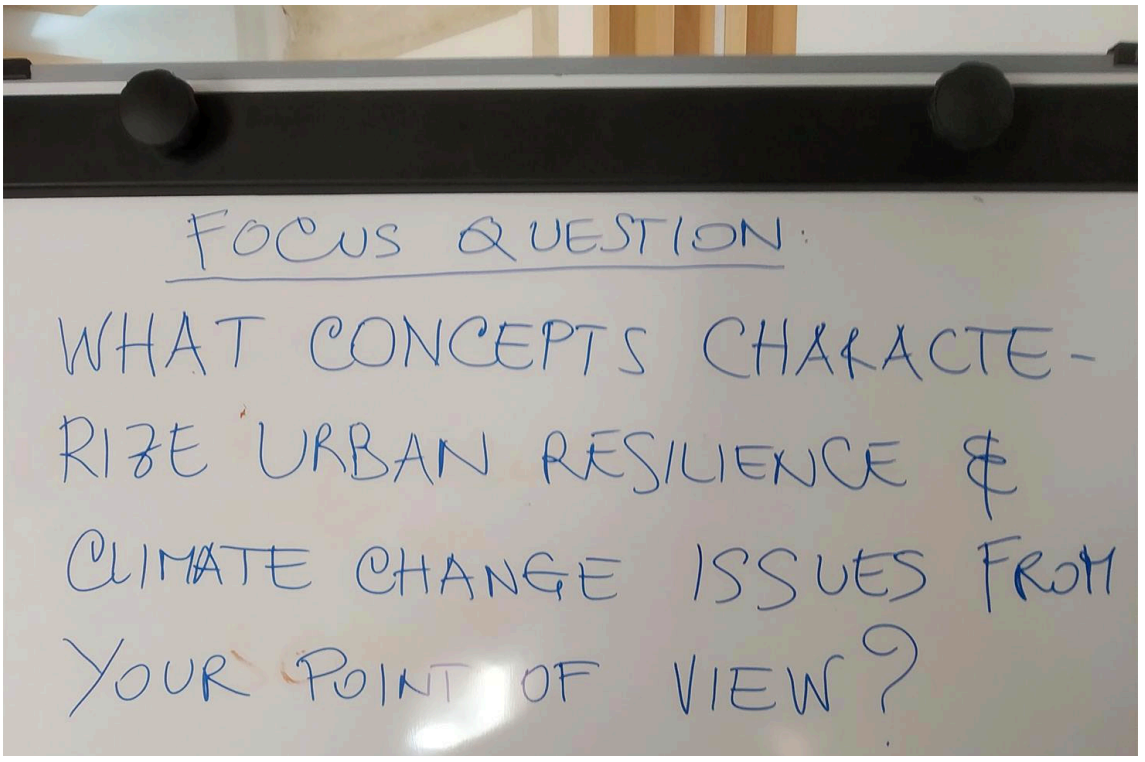
change adaptation skills in the Higher Education Institution (HEI). Initially learning the different approaches presented by the referring professors of the universities involved, and later taking on a mediating role in the implementation of CMaps with the participating Bachelor's or Master's degree students.

The CMaps presented during the course are tools capable of returning complex answers to specific questions for which it is essential to first identify the scope of the focus question. Proceeding with a linking process the competences of each participant flow into the maps to be debated, questioned and reworked. The final result is a closed circuit in which the various contributions constitute a shared methodology, specific to the subject tackled, but which at the same time can become a link in a chain formed by other contributions capable of providing answers to broader questions.

The holistic approach at the base of the InCLIMATE project was therefore accomplished in an intellectual contamination that does not distort individual competences but gives an original and innovative identity to the final product. This method can draw a guide for the entire HEI sector: from the construction of questions to the sharing of results. In particular, the InCLIMATE project's goal of developing an Open Educational Resource (OER), of which CMaps are the emblematic tool, can help coordinate climate change adaptation policies towards shared and effective results.

Even in Italy's Inner Areas, environmental protection and the climate crisis are particularly influential factors, suffering the consequences of depopulation dynamics in these territories. With the loss of a presidium based on agricultural, productive and environmental protection activities, climate change events amplify their effects, generating unsustainable social costs. Updating territorial rebalance policies could therefore generate regenerative effects also for the adaptation to climate change. In the context of the research on the revision of the current method of classification of Inner Areas in Italy - currently under development in the PhD course Landscape of the contemporary

city. Policies, technique and visual studies - the possibility proposed by the InCLIMATE project of sharing different strategic approaches related to a common issue on an OER is of considerable interest. In particular, the Strategia per le Aree Interne (SNAI) in Italy, like the Agenda Rural in France or the España Vacia theme in Spain, highlight common criticalities, which are, however, addressed with multiple solution strategies. In conclusion, the possibility of coordinating the study of different approaches through a sharing of competences and processes, integrating sensitivity to environmental impacts, could fill the "knowledge gap" between the different territorial rebalance policies in Europe, producing positive transversal effects on various ambits.many CES, which are non-material, intangible, and invisible compared to other SE (Cheng et al., 2019).



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Multi-criteria evaluation tools for buildings conversion

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Keywords: Multi-criteria approach, C-Map tools, sustainability performance

The contribute presents the educational experience of the intensive Course InCLIMATE -Integrating Climate Resilience in EU Higher Education- held at the Valletta Design Cluster of Malta, as part of Ph.D. research carried out at the Department of Architecture of Roma Tre University. In broad terms, the contribute describes the doctoral research consistent with the doctoral project from the PON call for proposals (37th cycle), and more precisely the multi-criteria approach for buildings conversion with a potential use of the Cognitive Maps (CMs).

Research border environmental and social sustainability evaluation, with respect to the relationship between building and user preference. Two systems of performance measurement (predominantly quantitative the former and qualitative the latter) which is difficult to integrate system of global building evaluation resulting from hierarchies and shared choices. In this sense, the research aims to take into account sustainability as an inherently multidimensional problem where environmental, social and economic factors are involved are not mutually measurable [Stirling, 1999]. The resulting decision-making process appears difficult, likening the transformation process of such transformation to a complex system. Complex systems could be as problems that are difficult to visualize using a single perspective [Munda, 2004], systems of a nonlinear nature where the input of input data is not matched by a predictable output data [Bertelsen, 2003] or more simply as those systems that are not perfectly predictable.

Furthermore, the Ph.D. research considers multi-criteria evaluation tools (Figure 1), capable to combine sustainability performance in its social, environmental, and economic dimensions. The research aims to bring into mutual communication the economic, social and

environmental performance measures in a single and methodological framework, capable of providing a comprehensive reading of the available design alternatives.

The educational experience in Malta focused on the CMs tool, meant as graphical representation capable to capture individual knowledge, in terms perception [Eden, 1992], supported by C-Map Tool software [Cañas et al., 2003] that would allow not only, graphical representation of concepts, but also interactive sharing with the open-source C-Map Cloud. To this end, since CMs have been applied primarily in psychology and the behavioral sciences [Kpoumié et al., 2017], more precisely as part of problem structuring approaches (PSMs), could fit the complex social and environmental problems. Recent research [Marttunen et al., 2017] found integrations between CMs and MCDA, which could help in other perspective understanding and structure individuals or groups ideas, in workshop background.

In this regard, the Intensive Course in Malta suggested the purpose of CMs in higher education and it would be useful for the Ph.D. research to observe the feedback of the problem structuring approach taking into account different perspectives, challenging on the other hand in terms of merging individual or collective group map, but also could bring the goal of alternatives and/or sets of indicators construction to facilitate the decision process.

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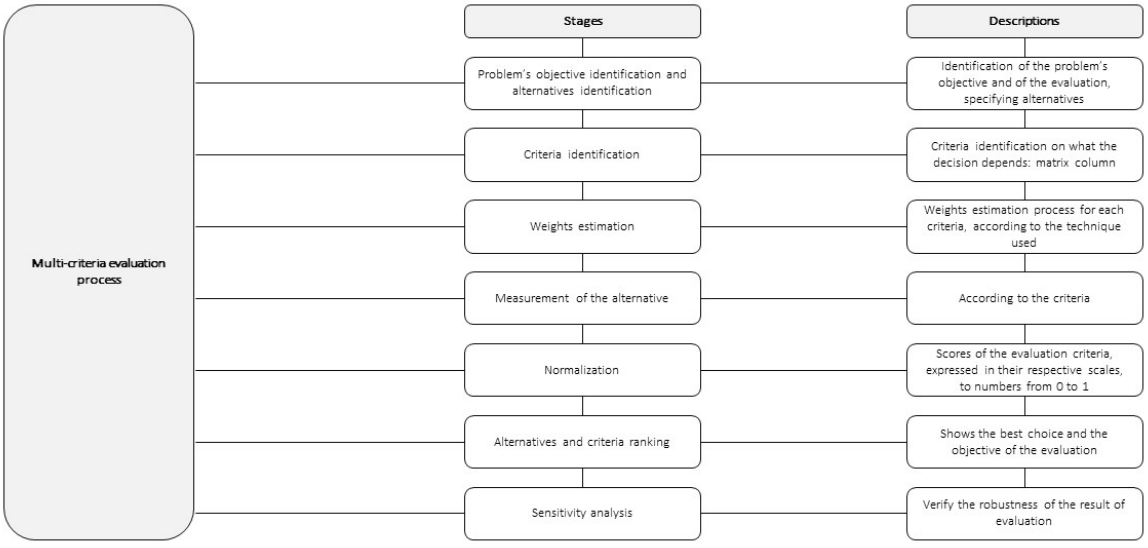
Fig.1. Identification of the steps of multicriteria evaluation tools.



Public space and Climate Change: adaptation to Urban Heat Islands as an opportunity to revitalise urban public spaces

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Keywords: public space, urban heat island, adaptation

Humans, more than every other living being, have shaped the environment that surrounds them, moulding Nature to their needs and will: a feature that defines the essence of humanity or, in other words, it is what "separates human existence from all mere animal environment" (Arendt 1958, p. 2). Since the Industrial Revolution, anthropic activities have modified Earth with an unprecedented impetus, to an extent that has made Earth - "the very quintessence of human condition" (Arendt 1958, p. 2) - an inhospitable place to dwell in. In this context, cities are the places that suffer the consequences of a fatalistic trust on progress the most, as they are the places where both population and human activities are the most dense: according to the UN-Habitat World Cities Report 2020, urban areas occupy only 2-3% of Earth, yet more than half of the World population lives in cities; urban areas, alone, are responsible for 70% of global emissions.

Cities suffer the consequences of climate change, as they are vulnerable to hurricanes, floodings and heat waves; but cities themselves interact with Climate at the local scale: the most widespread effect is the so-called Urban Heat Island (UHI), a phenomenon by which urban areas are significantly warmer than the surrounding rural areas, due to the high concentration of human activities, the impermeabilisation of the soil and the lack of vegetation (Oke 1982). The combination of the Urban Heat Island (UHI) and the increasingly frequent heat waves can have a huge impact on the health of citizens, especially among the most vulnerable ones (Conti et al. 2004).

Urban areas are the main focus of my research or, more specifically, how the architectural design of public spaces can contribute to

adaptation to Climate Change. Cities are the place where the homo faber meets the animal socialis: what defines a city is not only the degree of aggregation of buildings, but also the type of relation that characterises the empty space among them. Public space is where humans, since the Greek polis, interact and are free to dwell; it is a fundamental extension of his private realm.

Starting from Modernism, public space has become an "excipient in which to immerse buildings" (Secchi, in Croset 1993, p. 6): according to Modernist architects and planners, the space among buildings had to be permeable to movement with as little friction as possible; it is, indeed, the space of velocity rather than the space of human relations. This distortion of the traditional values of the urban public space has, in this way, contributed to its ongoing crisis.

My research aims to bring together the issues of Climate Change and the crisis of urban public space: by doing so, it proposes the implementation of measures of adaptation as a means to revitalise public spaces, restoring the values it has now lost. Architectural design alone cannot provide the solution to making our cities more resilient. But what an architect is trained to do is orchestrating different disciplines (e.g. Engineering, Technical Physics, Urban Planning, Forestry and so on) within the same project, as it would normally do in a construction site.

The InCLIMATE project addresses the need of an holistic approach to climate risk management issues. The experience in Malta has enabled me to widen my knowledge on the topic, especially outside the boundaries of Architectural Design. In order to be effective, my research must take into consideration that adaptation to Climate Change is a multidisciplinary matter, as the tools developed within each specific discipline cannot solve the problem on their own. Conversely, they can work together with an coordinated approach: Real Estate Development can foster the regeneration of urban districts employing NBS (nature-based solutions), whilst Urban Forestry can provide the required knowledge on how to implement those solutions in a urban

environment, selecting, for instance, highly resistant species that can contribute to lower the temperature of a square. A square that, if its environmental comfort is adequate, can be lively again.

My research, moreover, aims to put together two very specific and distant topics, such as public space design and adaptation to UHI phenomenon: a sociological and architectural matter versus a climatological and technical one. The use of cognitive maps, linking different concepts among the two fields of knowledge, is certainly a powerful and useful tool to develop during the research process.

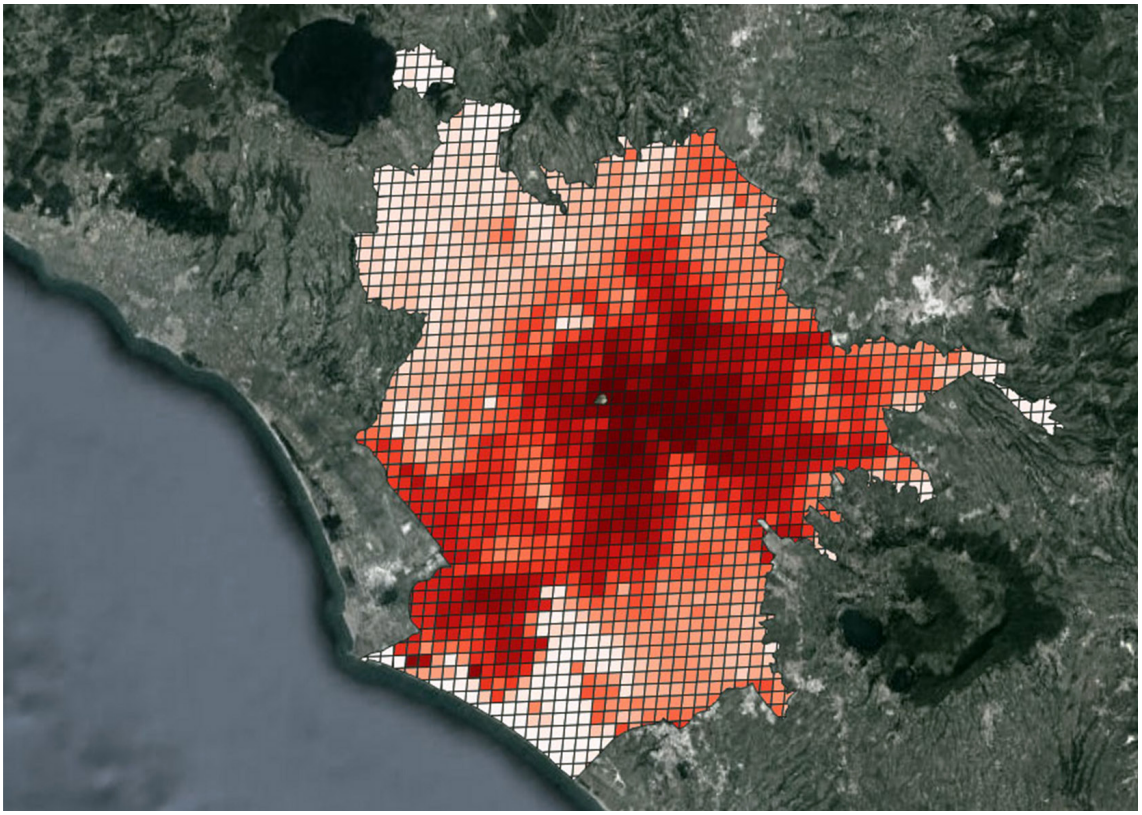

Fig.1. The UHI phenomenon in Rome: graphic elaboration of NASA MODIS satellite data regarding the city of Rome, showing the summer mean temperature from 2001 to 2010. Image courtesy of Francesca Romana Cattaneo, Roma Tre University

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CONCLUSIONS

Outcomes from the InCLIMATE project and future perspectives

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Keywords: urban resilience, CMapping tools, urban planning

Introduction

Since the modern age, trades and skills have developed theoretical and practical paths codified as specialisms.

Accordingly, current trends in higher education are keen on focusing and finalizing sector-specific career paths, whereas our living environment claims for addressing complex issues embodied by comprehensive concepts often with no defined boundaries.

When it comes to urban resilience, current assessments predominantly focus on technical aspects and on engineering solutions. However, such issue challenges disciplinary approaches and intervention models by calling into question specialists as such and in dialogue with their peers from other fields, while requiring spatial planning to encompass expert knowledge within a broader frame taking into account the whole picture.

From saying to doing. Planning on the move

As a matter of fact, urban resilience is gaining momentum in the planning discourse as a regulatory concept influencing decisions concerning climate change adaptation and mitigation measures and social issues involving people both as subject and stakeholders. First of all, it is necessary to build up sound knowledge, in order to identify the most suitable priorities and resilience dimensions in urban agendas fitting the basic needs of cities and urban regions. According to a systemic perspective, current planning debate faces the need for such synthesis by: (i) systematically identifying connections between (sub)systems which are normally assessed separately, (ii) detecting feedbacks between system components which may reveal unintended

consequences of resilience interventions and by (iii) obtaining a wider portfolio of potential interventions to increase overall resilience (Tepes, Neumann, 2020).

The Erasmus+ project InClimate - Integrating Climate Resilience in Eu Higher Education – in addressing the questions How do urban resilience issues impact on current planning practice? and What could be taught about urban resilience? – has brought into play academic profiles and expertise in distinct fields making use of Concept Maps, of easy access and check, as possible facilitators in an overall comprehension of ongoing process affecting climate issues.

The results achieved in the modular courses accommodated within the courses held at Roma Tre, grouping students in clusters of 3-4 people, have been assessed according to the following grid, scoring over 4 points on average (Table 1).

7	Consistent originality, insight, and work of high quality: virtually flawless understanding and application of course syllabus material and learning objectives covered to date; can apply methods and knowledge to a wide variety of situations
6	Generally shows insight and originality; consistent evidence of analysis, synthesis and evaluation where appropriate; consistent and thorough understanding of course syllabus material and learning objectives covered to date; can apply methods and knowledge to a wide variety of situations
5	Generally shows evidence of analysis where appropriate and may on occasion show insight; consistent and thorough understanding of course syllabus material and learning objectives covered to date; can apply methods and knowledge to a variety of situations
4	A solid understanding of course syllabus material and learning objectives covered to date; can apply effectively methods and knowledge to situations that are expected and predictable
3	Some understanding of the required skills and knowledge demanded by the course syllabus material and learning objectives covered to date; can apply methods and knowledge to situations that are expected and predictable only with teacher support
2	Has significant difficulty understanding the required skills and knowledge demanded by the course syllabus covered to date; cannot apply them, even with teacher support in predictable situations
1	Failure to meet the learning objectives at any meaningful level

The Erasmus+ partnership has also provided a syllabus to clarify the use of the wording and technical jargon in different fields of knowledge, and, in case, to share a common language about resilience and its derivatives. During the workshop in Malta, differences in the age, origin, and field of expertise of participants helped make the test results more reliable, improving cross-sectoral communication, and fulfilling a more reflective, inclusive, and integrated assessment than current approaches. In developing Concept Maps, two main aspects have been especially dealt with: (i) the development of core competences devoted to implement specific skills within the disciplinary background; (ii) the enhancement of side/soft skills in an interdisciplinary perspective comparing opinions and sharing visions with other students/practitioners. Definitely, academic profiles are due to allow new professionals manage and implement their skills through life-long learning processes, but also converge and interact with other specialists on objectives, strategies, measures, and actions by using their own methodologies.

Fig.1. Paris, Seine flood, June 2016. Photo credits: Anna Laura Palazzo.

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