Diary extract of five research experiences in the XXXIV Italian doctoral cycle. Sharing common research questions on environment-oriented planning

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Abstract

In a time of renewal of the themes, interests, and applications of urban planning disciplines, is it possible to read continuity between the ongoing doctoral research? Despite Italian universities focused on project-making and urban planning, they often appear as closed groups, impermeable to external influences and synergies: still, examples of interdisciplinary syncretism and academic contamination could be found both in past research and emerging practices. Through the presentation of 5 research questions, developed by doctoral students from Italian universities, the paper is aimed to recognize a *fil*

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rouge made up of common interests. The proposal is oriented to recognize, through analogies and common traits, the potential of interdisciplinary comparison and research networks. The opportunity for concertation among PhD students arises from the fruitful participation in urban studies training activities and workshops tailored to doctoral studies, and from a two-year exchange of ideas and perspectives. The dissertation themes include the identification of the wickedness of some crucial problems that contemporary environment-oriented planning is called upon to address. They relate specifically to the issues of climate-proof planning, resilience, action research processes, regeneration of peri-urban areas. After a theoretical definition of wickedness to which the authors refer, five Diary Extracts are presented and compared by highlighting: 1) the existing interconnections between research questions, objectives and methodologies, 2) the implications for research and practice in the field of environment-oriented planning. Finally, the essay provides further remarks on the learning opportunities grounded on sharing and contamination among young scholar researchers.

Keywords

Doctoral Research; Environment-Oriented Planning; Wickedness; Networking; Innovative Contamination

Wicked problems and their implications in the environment-oriented planning: finding a compass in young scholars researches

The early decades of the twenty-first century brought to light a series of unique problems in the way the planning disciplines studied and designed the territory. New social conflicts, cutting-edge technologies, climate changes, the crisis of economic paradigms combine to define an unprecedented scenario both from an urban and a social point of view. As sometimes happens, research can predict future crises. An example is a definition given in 1973 by Rittel and Webber about planning problems. The authors of the essay "Dilemmas in a general theory of planning" (Rittel and Webber, 1973, p.160) define that "planning problems are inherently wicked".
From nowadays point of view, the increased awareness of global problems, not only local ones, and the resolution of spatial information can only lead to an agreement with the wickedness definition of territorial-making. Human interactions with the habitat (and with the different issues to it connected) are proactive. Unlike many other species, the approach of homo sapiens is to modify and alter the *status quo* to expand its ecological niche. This optimization of the anthropic space, as well as the interaction with other individuals, the complex functions linked to the construct and social conventions, generate problems. Therefore, the management of these problems requires different strategies with different and uncontrollable performances and side effects. Generally, it is possible to divide the problems into two main paradigms (Kreuter et al., 2004): tame problems, which are the ones for which there are scientifically based protocols that guide the choice of

solution(s), and wicked problems, whose solution(s) is (are) based on 'judgments' of multiple stakeholders. Wicked problems are the ones usually managed by urban planners. The planner figure is that person who seeks, through a discipline, to develop strategies to manage a vast set of issues linked to spatial and interactive life. The definition of this figure is generally referred to as the wideness of the territory-making processes. In a tame problem the definition of the problem itself unveils part of the solution, the causes of a problem can be determined by experts using scientific data and the task is completed when the problem is solved. By opposite, a wicked problem has different characteristics. For instance, it cannot be definitively formulated, it has no 'stopping rule' and it is not always unique (and so is its solution). A solution to a wicked problem is not 'true-or-false' but tends to be 'good-or-bad'. Besides, a wicked problem can be considered as a symptom of another problem, and this typology of problems cannot be solved, at best it can be only re-solved – over and over again. An example of a wicked problem can be represented by climate change management (Musco, 2016). In this case, the global warming phenomenon can be interpreted in its causes and solutions as a social, cultural, economic, environmental, urban, and political problem (Levin et al., 2012), that embeds a wicked problem since it is illusory or difficult to pin down and influenced by a constellation of complex social and political factors, evolving during the different phases of problem treating. Reflections on how to manage contemporary complexity have questioned modern epistemology. An example is a post-normal science highlighting how facing complex problems with high levels of uncertainty leads to the wavering of confidence in the integrity of science and its ability to respond

adequately to modernity challenges (Funtowicz and Ravetz, 1990). For this reason, post-normal science aspires not to ascertain a truth due to its uncertain nature but to gather as much information as possible to make wise decisions that take into account all legitimate perspectives, produce consensus, and be inspired by the principle of precaution. This epistemological trend wishes for an extended peer community, justifying the theme of participation in decision-making processes and in the co-production of knowledge at the basis of the "open science movement" (Elliot, 2019; Levin et al., 2016) and of the citizen science practices (Irwin, 1995; Bonney et al., 2009; Cavalier and Kennedy, 2016).

What emerges is a question: how is it possible to manage wicked problems within the discipline of urban planning both considering present and future challenges?

Notwithstanding the disciplines linked to planning seek to find both complex and punctual solutions to the increasing socio-environmental problems, however, the current scenarios require the implementation of trans-disciplinary research and actions, that are hindered by - among other factors- the isolation and the lack of contamination between Academies and between the Academia and territories.

The absence of spaces of horizontal discussion and peer learning moments has a negative effect, in particular on young researchers that are starting to explore their research path and who would benefit from further, deeper debates. Despite at international levels such niches of development of critical thinking exist (for instance, see the Young Academic Network),, they don't within the Italian context, with few exceptions, such as a previous experience called *Rete Nazionale Interdottorato in Urbanistica e Pianificazione Territoriale e Ambiental*e, already stopped, and

some workshops and seminars, still providing mostly unidirectional teaching. It was during one of these few training activities that the authors have met and felt the call for filling such gaps by also carrying out a common reflection.

The present essay enshrines the first results of such confrontations. It attempts to scrutinize and enhance synergy among five ongoing Italian doctoral research to demonstrate how a syncretic approach in addressing real wicked planning problems can have innovative implications on research practices and environment-oriented planning. Formal and informal meetings have allowed the authors to systematize their research questions, objectives, and methodologies into PhD Research Diaries presented in the next section, and to recognize a *fil rouge* among their research themes developed during the XXXIV Italian PhD Cycle (2018-2021).

Generally, the contributions extracted relate to climate change impacts and the urban environment, considering the strategies for mitigation and adaptation (I. Diary Extract), the complexity and uncertainty issues including disaster risk management and assessment (II. Diary Extract), sustainable management of urban and energy resources and stocks (V. Diary Extract), decision making, knowledge interaction & public participation in environmental modelling, planning and governance (III. & IV. Diary Extracts).

The subsequent section highlights the existing interconnections between research questions, objectives and methodologies and assesses and their implications for research practice in environment-oriented planning.

In conclusion, how to possibly trace and read a mutual learning approach in the authors' experience is the

question to which the authors try to answer. The next sections offer a systematic presentation and an integrated reading of these topics to recognize common issues and to have mutual input by addressing research questions from new perspectives.

Diary Extract of research experiences

The authors first met at the YoungerSIU 2019 (Italian Society of Urban Planners) workshop for young scholars in Ruvo di Puglia. During this initiative, they were called to face the planning of inner areas affected by environmental issues. Here they discovered commonalities between their research fields and started discussing the various ways to deal with issues and their planning, such as disaster management, climate change, resource wastefulness, anthropic footprint, and socio-economic spatial injustice (Figure 1).

Beyond the different backgrounds and academic stances, the authors tried to trace a common interpretation of their work aimed at finding collaboration opportunities and scientific growth. An extract of each research is reported in the following tables, presenting the same elements to achieve a multilevel comparison.

Each Diary Extract (DE) is a partial illustration of the main features of each PhD, that are: the title of the research, research question(s), keywords, the wickedness of the topic, objectives, methodology, limitations, ambition, and main references. All the authors are currently in the process of completing doctoral research; as such their research projects are ongoing.

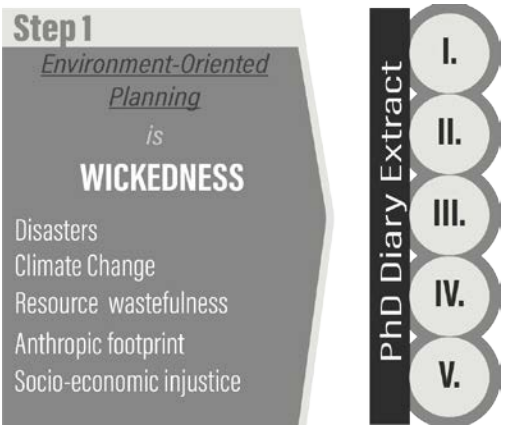

Figure 1 - Five PhD Diary Extracts to deal with the wicked problems of the environment. Source: authors' elaboration.

I. Diary Extract: Towards a Landscape Climate Adaptation Approach for Mediterranean Coastal Areas. Integrating strategies Land-Sea Contexts.
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Research Question(s): Can landscape planning be the approach to finalize the integration between climate resilience principles and the territorial regulation framework? Can this approach be the core of the effective and systematic implementation of adaptation strategies in complex areas such as the Mediterranean basin?
Keywords: Mediterranean basin, climate change adaptation, territorial planning, coastal management

The wickedness of the topic:
The Mediterranean Basin is characterized by a strong connection between the maritime space, water, and coastal settlements. These characters forged its history and are the base of the future of the region. Med coasts are facing huge environmental and social challenges, due to the scarcity of water, unsustainable agricultural practices, over-exploitation of natural resources and the rapid increase of climate change impacts on urban areas and the environment (Maragno et al., 2020). Understanding the present and the future complexity of this interconnected scenario is the key element to undertake strategies and actions. The representation of Land-Sea Interactions over Med coastal areas highlighted the wickedness of a holistic planning approach.

Objectives:
The research aims to prove that the integration between Landscape Planning and Coastal Zone Management can generate an effective tool for the implementation of the principles of climate adaptation in territorial governance. The goal is to develop the concept of Land Sea Landscapes Transect (LSLT) through the comparative study of Mediterranean coastal areas from a climatic, landscape and management point of view. The LSLT can be a territorial unit which can merge coastal and the sea-space needs and strategies, supporting transboundary Landscape Planning (Abbunasr et al., 2018). The assessment phase strengthens the research ambition to overcome the limits imposed by the cultural, economic, and geographical features and to produce a shared tool for the Med area.

Methodology:
The methodology is based on two investigation axes: the study of the main Landscape and Maritime planning tools for the Mediterranean basin, the study of local climate impacts exposures and the adaptive capacity of a case study set. Therefore, the integrated description of the main territorial dynamics advances through the study of the physical and administrative characteristics of each specific area. The comparative analysis of these results is a process aimed at supporting specific guidelines which can define the process replicability. The guidelines aim at presenting an open Landscape planning approach which understands present

territorial pressures and considers the climate exposure of strategic elements.

Limitations:
One limiting factor for the implementation of the integrated Landscape planning approach is the fragmentation of existing databases and information sources. The territorial knowledge framework is generally divided into different information repositories, which sometimes are not publicly accessible, and may cause a fragmented interpretation of the real territorial condition. Another crucial element which limits the implementation effectiveness of this possible approach is the public body's lack of determination. Different international bodies promoted initiatives aimed at a better and sustainable future in recent decades, nonetheless, these initiatives failed against the unwillingness of public decision-makers and the lack of interest in private stakeholders. Adaptation and mitigation planning or sustainable development principles still have not become mandatory in territorial planning. Existing Landscape Planning tools have characteristics capable of triggering a retrofit in territorial governance tools and can play a central role to overcome their limits. The research may encounter a lack of collaboration from public bodies. Nevertheless, local authority support is necessary to fully understand the technical organization of existing planning tools and to develop an effective guideline.

Ambitions:
The research seeks to develop a model capable of overcoming the differences among the cultures, territorial morphologies, religions, and planning approaches with the purpose of a sustainable Med coastal growth. Basing on the acceptance of the emancipatory catastrophism concept, the goal of the thesis is to define a Mediterranean knowledge and planning integration approaches to cope with future challenges. Reading territories and adapting landscapes constitutes a holistic approach to effectively transform regional governance. The ambition is to implement this concept in local planning tools through a transboundary interpretation of Land Sea Landscapes Transects. One first test could be the integration between Climate Adaptation Planning and Maritime Spatial Planning in Land-Sea Interaction contexts, retrofitting

regional governance frames. The combination aims at giving support to local authorities in managing wicked and overlapping issues, providing a single interpretative and strategic approach. The interpretation of the territory seeks that natural bond between the coastal habitat and water in its broadest sense. Land-Sea Landscape is the centre of this interpretation and has the aim of regenerating Mediterranean planning approaches and sustainable growth. The water cycle, the influence that the climate has on urban systems and the bio-regions, the perception and desires of landscape inhabitants compose the same knowledge framework to produce a shared approach for the basin of the Mediterranean.

Main References

- Abunnasr & Infield (2018)
- Albrechts et al. (2020)
- Blečić et al. (2015)
- Cervellati P.L. (2000)
- Indovina F. (2005)
- Maragno et al. (2020)
- Pietrapertosa et al. (2019)

II. Diary Extract: Environmental Risks and Metropolitan Areas: Smart Approaches and Tools for Enhancing Urban Resilience

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Research Question(s):
Can risk-knowledge be more effective? Is it possible to better support risk-informed spatial planning by updating, shearing, giving a spatial dimension and integrating knowledge-risk frameworks? Can this lead to an open and evolving learning process?

Keywords: vulnerability, multi-risk assessment, disaster risk knowledge, resilience

The wickedness of the topic

The growing vulnerability of urban areas to hazardous events is due to numerous factors: the unpredictability of some flash climate-related events, the complex dynamics of urban growth and the ineffectiveness of the urban policies in providing adequate responses to the need of reducing risks. The issue of urban vulnerability to disasters has gained over the years a growing relevance in the planning debate, also thanks to the evolution of the sustainability paradigm and to the increasing relevance of the concept of resilience in guiding urban dynamics (Cutter et al., 2008; Alexander, 2013). Despite numerous advances in risk knowledge, disaster losses continue to grow even more (White 2001). The complex chain between natural hazards and urban growth configures one of the main wickedness of our time. The main international documents in the field of Sustainable development and Disaster Risk Reduction (2030 Agenda, Sendai Framework for DRR 2015-2030, 2015 Paris Agreement on Climate Change) and scientific literature emphasize the relevance of learning capacity of urban systems, intended as a constantly evolving process aimed to combine experience and knowledge for facing current multiple risks.

Objectives:

The research aims at developing an integrated frame capable of providing effective knowledge of the numerous and sometimes interrelated risks threatening urban areas, constantly updatable, open to different stakeholders and specifically tailored to the needs of planning processes at the metropolitan scale.

Methodology:

The methodological path starts from the systematization of the methodologies proposed by several European projects that have addressed over the years the aspects of the vulnerability of urban systems and the complexity of disaster risk chains. This allows the building of the knowledge-frame step by step: from the systematization and spatialization of the available data to the identification of the interactions among hazards and vulnerabilities

and the development of spatial-based multi-risk knowledge; the definition of multi-layers accessibility to facilitate shares and updates of the knowledge-base.

Limitations:
Despite the already complex challenge related to sudden-onset hazards and the complex interrelations among multiple hazards and vulnerabilities, comprehensive knowledge of risks also includes slow-onset hazards, such as human footprints on the environment as well as many long-term effects of climate change.

Ambitions:
The guiding principles for strengthening disaster risk management, starting from a better knowledge of existing and emerging risks, can be summarized as follows: a) from sectoral to cross-sectoral knowledge; b) from technical approaches to participatory processes, c) from "static" to "dynamic" knowledge, supporting a continuous learning process.
Cross-sectoral knowledge (a) allows overcoming the still prevailing assessment of risks in a sectoral way in favour of a comprehensive multi-risk assessment, capable of taking into account both the mutual influences among different hazard factors and the potential interactions between hazards and exposed vulnerable assets.
Evolving learning processes (b,c) allow increasing knowledge and perception of all risks, provide a framework for disaster risk management by combining communities experience and technical knowledge, by integrating the memory of past events and updating information on risk features; by outlining the likely risk scenarios.

Main References

- Alexander D.E.(2013)
- Birkmann et al. (2013)
- Cutter et al. (2008)
- Galderisi A. (2018)
- Kappes et al. (2012)
- McHarg I.L. (1969)
- White et al. (2001)

III. Diary Extract: Toward a Street-Small-Slow approach to research on risk landscapes. Diffused knowledge, toxic autobiographies and small data from a Sicilian petrochemical town

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Research Questions:
Assuming that ours is a transition era, which can be the role of urban planning in supporting inclusive transitions towards environmental justice in urban contexts? In addition to the quantitative approaches, which methodologies can fit with current issues, such as the impacts of climate change and of contamination? In risk landscapes due to the slow contamination can an insatiable high-tech growth ideology be enough? Or maybe planners could propose a slower, smaller, and more community-based planning?

Keywords:
Environmental injustice, storytelling, risk landscapes, contamination, citizen science.

The wickedness of the topic:
Since 1992 Ulrich Beck defined our society as a risk society in which no-one is exempted from the risk provoked by itself. Given that the possibility to avoid risk depends largely on socioeconomic status, dealing with risk means dealing with socio-economic injustices. In this respect, various fields of knowledge, e.g. the political ecology and the environmental justice studies (Agyeman, 2005; Pellow, 2007), have already widely scrutinized the link between health hazards-environment-socioeconomic disparities and its effects on the right to the city of powerless communities). In the meanwhile, many community movements are struggling for a city with more justice: they represent those "sub-political actors" (Beck, 1992) with the potential to challenge the agents that generate risks. While the civic society reacted and organized itself, during the years official documents (WHO, 2010, 2017; Sendai

Framework, 2015;) have wished for a multidimensional approach to the risk assessment that is inseparable from the enhancement of democratic processes and the involvement of citizens in paths of public participation (Aarhus Convention, 1998) and co-production of knowledge. Despite the rich aforesaid debate, both the mainstream planning and the Italian law on industrial risk mainly miss all these nuances and adopt quantitative approaches to the risk landscapes based on high-tech innovation and big data. Many current challenges are concentrated in industrialized areas: from the human footprint on the environment to the job blackmail, from the public health issues to the lack of democratic governance. The deterministic approach -for which from a cause there is a consequent and linear effect- does not work with the contaminated landscapes. While understanding the causes is already a very complex issue, to define which exactly are the effects into human and not human components coming from the causes is something almost impossible. Uncertainties are a limit and weakness, as well as a strength if they are already included from the beginning of the comprehension path. Another wickedness aspect regards the role of both public institutions and local communities and the tension between them. Since landscapes are the fruit of the long-term interaction between humans and the environment, to talk about the physical aspects of landscapes means talking about the socio-economic and human ones underlying the landscapes. This adds a further variable of complexity in treating the topic of planning of risk landscapes.

Objectives:
With my research, I aspire to propose a Street-Small-Slow planning approach to the risk landscapes in the "extreme case" of Gela, a Sicilian town converted by a multinational oil company into one of the main Italian petrochemical poles in the '60s. Nowadays, Gela is a shrinking city having a contaminated ecosystem and one of the highest rates of sickness and unemployment in Italy. By applying such approach, I seek to show the value of a slow, street and slow way to plan places

Methodology:
The Street-Small-Slow planning approach is "street" because it occurs in the fieldwork with people living in it; "small" because it

pays attention to the small, qualitative, partial and relational aspects of landscapes; "slow" because needs time (Stengers, 2018). Therefore, my research aims to frame theoretically and apply practically an "undisciplined" approach consisting of street science (Corburn, 2005), active listening and toxic autobiographies (Armiero et al., 2019) as relational tools that catch qualitative "small data" and map resistant and resilient practices and collective capabilities.

Limitations:
By having comparisons with other young scholars' research, some drawbacks have emerged. For instance, a street-small-slow approach needs much more time than the one provided by a Ph.D. path, consequently the results of such research will likewise be partial and less deep than I wished for. Besides, this work would benefit from a joint team having planners who use big data and other professional figures, whereas so far it has been done without any kind of comparison.

Ambitions:
This research has multi-layers ambition. First, it seeks to get into the theoretical debate by giving relevance and dignity to small data from both an epistemological and methodological point of view. Also, it has the ambition to affect the Italian law and practices regarding the planning of risk landscapes, Finally, it will attempt to support processes of community awareness and empowerment by giving voice to the unheard voices.

Main References

- Agyeman J. (2005)
- Armiero M. et al. (2019)
- Beck U. (1992)
- Corburn J. (2005)
- Pellow D.N. (2007)
- Pizziolo G. & Micarelli R. (2003a)
- Stengers I. (2018)

IV. Diary Extract: Towards cyclical and regenerative planning: Methodologies and Decision Support Systems to regenerate abandoned landscapes

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XXXIV PhD Cycle

Research Question(s):
How can the geodesign approach make spatial planning processes regenerative, circular and participatory at the same time?

Keywords: geodesign, abandoned landscape, the impact on ecosystem services, circular economy

The wickedness of the topic
The phenomena of consumption and soil degradation continue to increase over the years, despite scientific, legislative and media attention. This uncontrolled phenomenon, with the passing of the years, has generated a new landscape, made up of interstices, middle territories, free strips along the main connecting arteries, areas waiting for development illegally built, spaces more and more fragmented and marginalized (Berger, 2007). A new urban fabric is born, made of voids between solids, where the contrast between natural areas, urban lots and infrastructures generates a mixture of areas that have taken on their own identity, generating new landscapes.
Among these landscapes, those resulting from the voids produced close to the infrastructure and left unused are united by the fact that they physically belong to the city but have been expelled from it for the end of their life cycle, for the incompatibility of their use with urban reality or the loss of their environmental and economic value. They represent a real rejection for society.
Talking about cyclical and more sustainable cities, these abandoned landscapes of infrastructure can be the cog in the wheel to trigger participatory processes of urban regeneration using innovative Decision Support System to think about the territories of the future.

Objectives:

The research aims to analyse the areas close to infrastructure, which can be interpreted in many cases as waste landscapes, to identify preferable regeneration scenarios, assessing the different types of impacts that such scenarios can have on the environment in general and on the loss of essential ecosystem services. The interaction between the Geodesign (Flaxman, 2010; Steinitz, 2010, 2012; Vargas- Moreno, 2010; Goodchild, 2010; Miller, 2012) approach and the spatial multi-criteria analysis represents the proposal to be tested to structure a decision support system that allows improving the system of relations between knowledge, evaluation and project, in coherence with Agenda 21 (chapters 31 and 40).

Methodology:

The evaluation of the benefits offered by this potential capital, through the identification of the ecosystems and services they produce in a regeneration phase, is one of the great challenges for scientific communities. Cities to meet sustainability requirements need cyclical planning processes, able to promote collaborative practices among all stakeholders, public, private, and social. These processes should be able to combine multidisciplinary knowledge, in which the assessment of impacts and effects of transformation is based on a methodological process in which different knowledge and skills and new technologies converge. The complexity of urban systems requires the activation of a constant dialogue between the different stakeholders involved in the transformations, integrating multidimensional approaches and plural points of view. In this perspective, decision support systems represent a useful tool to guide the construction of choices and compare possible transformation scenarios, intending to identify preferable and sustainable alternatives (Huang et al, 2019).

The attention to the different decision support systems that can support planning processes highlights the flexibility and adaptability of tools to the specificities of the decision-making context. Among the different approaches analyzed in literature and tested in numerous practices, Geodesign is one of the methodological references used in this research, able to support planning and evaluation processes for more sustainable cities (Campagna, 2014; Campagna and Di Cesare, 2016). This approach integrates different knowledge using the tools of Geographic

Information Systems and social interaction techniques (Goodchild, 2010).

Limitations:
An open approach to comparison with other research in similar fields allowed to define some potentialities and criticalities. One of the limits is the impossibility to have an open database to analyze large territorial contexts. This could be overcome by integrating big data with small data. Analyzing the territory in its complexity means looking at it in different perspectives and therefore not only considering the impacts that can be determined on ecosystem services, but also what consequences they determine: climate change, environmental risks, and vulnerabilities. Moreover, talking about circular cities, it is also necessary to define its metabolism. The active comparison allows defining some considerations that normally cannot be reached.

Ambitions:
The biggest challenge is to define a methodological framework that looks at landscape planning from the perspective of circularity, in order not only to reduce the impacts on the environmental, social, economic system but also on the production of material and immaterial waste generated by uncontrolled and bad planning processes. This is an ambition that finds innovation in the tools used to practice urban regeneration that put in place different knowledge and techniques. Innovation can be found in the interaction between evaluation Decision Support Systems within the Geographic Information System.

Main References:

- Steinitz C. (2012)
- Berger A. (2006)
- Flaxman M., (2010)
- Huang L., Xiang W., Jianguo Wu, Traxler C., Huang J. (2019)
- Batty M.,(2013)
- McHarg I.L. (1969)
- Cerreta et al. (2020)

V. Diary Extract: toward eco-innovative urban regeneration practices. From construction and demolition waste to resources for the regenerative city design.

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XXXIV PhD Cycle

Research Question(s):
How urban metabolism approaches may innovate the process of urban regeneration, and how does the goal of reducing construction and demolition waste flows influence the project?

Keywords: urban metabolism, regenerative city, circular economy, construction and demolition waste

The wickedness of the topic
Cities are the main global cause for the consumption of resources and the production of waste: while covering only 3% of the earth's surface they consume 75% of natural resources (UN, 2019) that, due to the "take-make-dispose" linear economic and production system, soon run out of life and becomes waste. 50% of them is produced in cities (UN, 2015) that are called to face European policies identifying the transition to a circular economy model as the main strategy to achieve the objectives of limiting landfills by 2035 (only 10% of waste) moving towards sustainability goals (EU Directive 2018/850). EU's circularity objectives led to new production and business models of consumer goods and buildings but the transition to a circular city model cannot, however, go through the technological and sectoral innovation in products/buildings in the city as this is a complex and wicked problem that includes environmental, social, economic and also spatial issues and thus requires a multidisciplinary and systemic approach (Jackson *et al.*, 2014).

Objectives:
The aim is the design of eco-innovative solutions (Carrillo-Hermosilla *et al.*, 2009) able to transform this circular approach into a design principle for the city and landscape and to influence

technical/process innovations for planning urban and territorial regeneration (Russo *et al.*, 2018). The research focuses on Construction and demolition waste (CDW) as they are almost a third of the waste produced globally and are connected to the results of urban regeneration processes.

Methodology:
The research activity is structured through the methodology of "Research Living Labs" which conceives the research path as a "Living Lab" where the experts involved (UNINA, RINA Consulting, TU Delft) collaborate and cooperate in a co-design process of innovative solutions in a real context. "Realism is one of the principles that clearly distinguishes Living Labs from other types of open co-creation environments" (Bergvall-Kåreborn and Ståhlbröst, 2009) and is the condition for obtaining valid and transferable results to real situations, according to with the objectives of the industrial PhD Innovative solutions will be tested in a case study located in the Metropolitan Area of Naples.

Limitations:
In terms of theoretical and methodological frame, the concept of urban metabolism underlines the technical-technological aspect of the functioning of cities without managing to include, especially during the time of doctoral research, the social and value aspects of territories. In the same way, the concept of circular - city - and economy describes the economic benefits of circularity, which however also concerns fundamental issues such as the life of different communities and their work. In the specific theme of the CDW, the inertia of the legislative context as well as its fragmentation in Europe, undermine the practicability and replicability of eco-innovative solutions. Currently, for example in Italy, CDW has not yet reached the end-of-Waste status (Silvestre et al., 2014) which would allow for simpler reuse and therefore the growth of the sector market.

Ambitions:
Applying the concept of circularity to cities and territories means, furthermore, asserting the need to overcome the concept of

sustainable development (Thomson & Newman, 2018), which aims to reduce environmental impacts of cities, to build a reparative relationship towards the ecosystems on which they depend, a regenerative approach able to positively affect the ecosystem (Girardet, 2014) and to drive space construction processes in order to generate not waste but resources to contribute to the regeneration of urban metabolism.

Main References

- Braungart M., McDonough W. (2002)
- Crowther P. (2005)
- Secchi B. (2006)
- Mc Gregor D., Simon D., Thompson D. (2006)
- Kennedy C., Pincetl S., Bunje P. (2011)
- Girardet H. (2014)
- Russo M. et al. (2018)

Weaving meaningful links through a proactive research comparison

To design the connection between Ph.Ds researches on different levels, the path follows three main steps:
Step 1, identifying the wicked dimension of environment-oriented planning (Figure 1);
Step 2, tracing research questions to address wicked problems (top of Figure 2);
Step 3, comparing the identified wicked problems through methods and objectives (bottom of Figure 2);
Step 4, discussing the adopted approach and new research-network perspectives.
Starting from the definition of wicked problems and the relationship with environment-oriented planning (first section), this paper has used the DEs to stress on the possible multilevel interpretation of contemporary cities

and societies and the need for more open planning approaches.
Each DE (second section) illustrates the deployed methodologies and seeks objectives aiming at composing a sample of an Italian kaleidoscopic view of young planners' approaches and visions.
By digging into the key-features of each research, two considerations emerge:
1) the complexity and wickedness referred to the contents and topics of the five pieces of research unveil the multiple existing links between them;
2) the debate behind this experience reveals the limits of the single approaches and allows the authors to rethink their way of researching young scholars.
Even if the research design might lead to the conclusion of an obvious overlapping of interests, however, it is hard to trigger proactive cooperation among distinct academic perspectives.
Figure 2 provides an interpretative tool and compass to interconnect viewpoints, confirming the need for a holistic approach to environment-oriented planning.
More in detail, Figure 2 explains how tracing the research questions to address wicked problems has led the authors to recognize common features and interpretative criticalities, as well as the opportunity for contamination between researches. Also, the bottom part of the picture tells that methods and objectives can be enmeshed and compared with each other. For instance, the authors have found potential interactions between quantitative methods and qualitative ones, theories and practices, high-tech and digital tools and street and 'personal' ones. The various nature of the identified wicked problems (Figure 2) gradually blurs the boundaries of all research allowing authors to intertwine topics, problems, theoretical

approaches, and methodological processes. The research keywords which at the beginning of the discussion belonged to the individual researchers, becomes the base for deconstructing and reinterpreting all contents and methods.

More in detail, the meaningful links between each keyword referred to the **methods** are the following:

a) the prominence of climate change in transforming disaster risks in different ways (Glasser 2020) requires complex analysis models, such as multi-hazard and multi-risk assessment models. They may need integrated approaches and practices toward learning processes involving multiple actors (technicians, politicians, stakeholders, and civil society);

b) co-production of knowledge needs fieldwork and active listening by researchers and planners. It can be pursued by counterbalancing the big data use challenge with complementary tools such as toxic autobiographies and small data;

c) regeneration practices to face current urban challenges transform environmental fragilities of growing urbanization (e.g. contaminated sites, abandoned areas and waste) into opportunities and resources. They should require innovative tools (e.g. Geodesign) and approaches (e.g. urban metabolism) to maximize the effectiveness of processes and to seize the opportunities given by multiple drivers (social, economic, climatic, etc.);

d) the awareness of dealing with complex territorial dynamics through multi-level governance models can lead to finding a way to implement this systemic integration within the current regulation frame of cities, territories, and landscapes also from a legislative point of view.

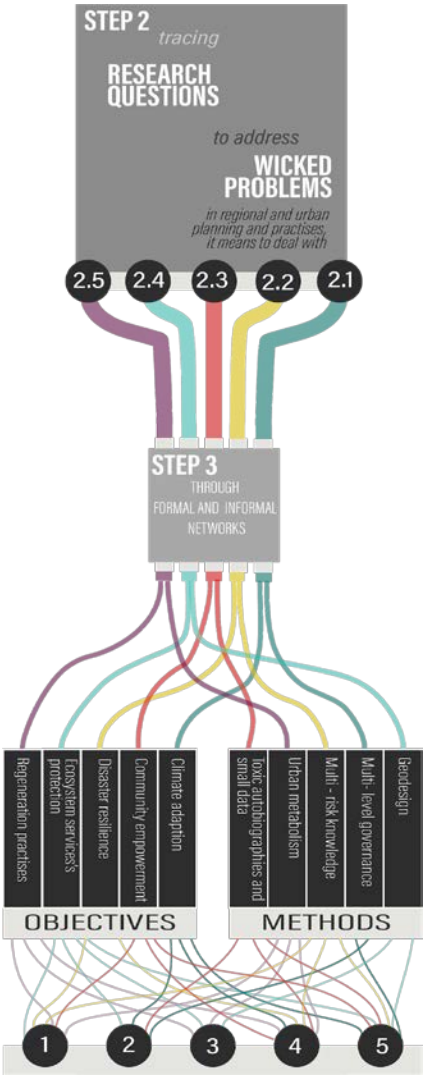

Figure 2 - Overcoming research limits through contaminations between objectives and methods of the 5 pieces of research. Source: authors' elaboration.

In terms of **objectives**, considering that each research is addressed to better understand different aspects of the wicked problem of environment-oriented planning, each research contributes to pursuing the others:
a) **climate adaptation** measures are frequently integrated with urban **regeneration practices** and contribute to strengthening ecosystem service in counterbalancing anthropic footprints;
b) increasing **disaster resilience** means also implementing effective mitigation and adaptation activities possibly included in urban plans and policies, and enhancing **community empowerment** to strengthen their learning and coping capacities;
c) **regeneration practices** can positively act on for the **ecosystem services' protection** by driving a transition towards new transformation models of cities.
The collaboration between authors and the attempt of merging each diary goal highlighted the different aspects of the wicked problem of environment-oriented planning and allowed to recognize the limit of sectoral approaches supporting territorial governance and planning. Therefore a holistic and conscious awareness can be the common ground on which researches can base exchange of energy and contribute to a proper sheared growth of the scientific community. As a result, is it possible to recognize a kind of process innovation also in the ways of doing research? Can this contamination experiment be useful for the authors as well as for young scholars in urban and territorial practices?
It is worth noting how wicked problems have pushed our research to a multi-scalar and multidisciplinary confrontation approach to face problems that have relations with social-economics and environmental disciplines. For sure, each research follows a different

research methodology and after this proactive comparison, the opportunity of approaching them from an enriched perspective emerged.
As the opportunity for this study arises from the involvement of authors in urban studies training activities and workshops tailored to doctoral students, and from an ensued two-year informal exchange of ideas and perspectives, these positive experiences represent the starting point for the construction of a research process - and network - able to overcome its nature of impromptu event and to orient, from the first steps, the increasingly heterogeneous doctoral paths. Through this experience, the authors recognize five key-attributes to build a common dialogue and to better cope with their researches addressing as urban and territorial issues. The attributes are (Figure 3):

- Open
- Collaborative
- Meta-disciplinary
- Stable
- Evolving

Opening the boundaries of on-going research towards new challenges allows young academics to better understand the context in which they are framed, recognizing both new connections and potential limitations of the adopted approach, as well as set objectives. **Collaborative** research helps in enriching different backgrounds and knowledge bases, as well as technical and technological skills. In this way, the innovative approach is **meta-disciplinary** not only multidisciplinary - defining an inclusive debate capable of

involving various perspectives of that same subject, whose need emerged in the previous chapters. To contaminate and fruitfully effect on research paths, this collaboration - and process - can only be lasting and **stable** in the research pathways among young academics and that it is a constantly **evolving** path leading to the formation of always innovative contributions to solve wicked problems, rather than an individual attempt to deal with complex problems.

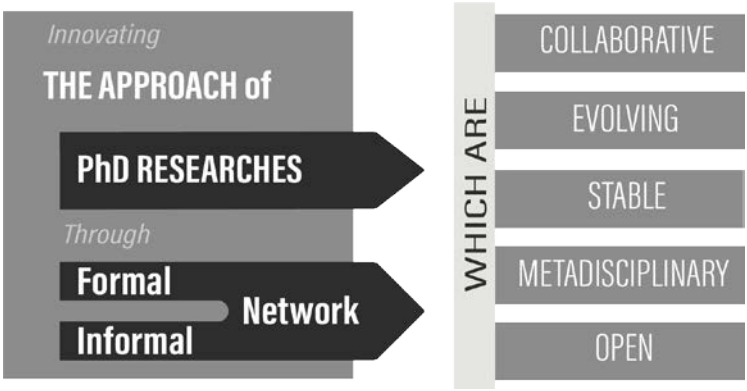

Figure 3 - Five keywords to define an innovative approach to PhD urban research. Source: authors' elaboration.

Conclusive remarks

By stemming from the definition of planning problems as inherently wicked, the authors have then tried to go through the wicked problems within the discipline of urban planning by adopting their ongoing PhD researches as emblematic cases of study. Considering that planning is even more wicked due to the lack of contamination and

exchange between the several schools and currents of thoughts, this essay seeks to provide a contribution in this sense bridging the existing dialogical gaps. The advances of this essay consist precisely in proposing an increase and implementation of occasions and spaces of peer discussion among young scholars within the Italian planning academia. Through the comparison of the five PhD pieces of research in urban planning, many issues emerged. The wickedness of environment-oriented planning, as a whole, comes from criticalities and challenges: the key challenge of climate change (I. DE) and the role assumed by planning processes in increasing the effectiveness of adaptation measures; the assessment of vulnerability in urban systems threatened by the impacts of multiple hazards to drive planning processes in already compromised systems (II. DE); the need for exploring the complex, polysemic, and conflictual links between natural and human factors, by adopting more innovative tools - such as toxic autobiographies, small data (III. DE), and Decision Support Systems (IV. DE) - and approaches - such as urban metabolism (V. DE). The informal comparison held within the present article redaction and the formal attempt of reporting its output, lead authors to a set of general considerations approaching researches which have the aim of assessing the wicked problem of territorial planning.

What limits an effective democratic and widespread advancement of local knowledge, as it emerged within DEs comparative assessment, is the lack of theoretical synergies between the different souls of the same research field. Therefore this cannot lead to a possible simplification of wicked territorial problems. A possible solution could be, for instance, a holistic approach in developing a sheared background for research which

assesses and copes with territories, in particular, considering the Italian context.
Based on the awareness of the wicked concept, the authors tried to provide an innovative approach to cope with this kind of problem and to give a methodological contribution to the research on territorial governance through their PhD paths. Despite annual meetings and congresses are structural opportunities to share experiences, researches, and approaches on the wickedness of planning problems, further interaction among young scholars is necessary. Nevertheless, this is a silent work that always lays beyond more evident and sponsored academic activities.
By grounding in this experience of a collective and collaborative research journey, we believe that despite planning is a wicked problem, employing the creation of space of peer discussion and mutual learning for young scholars, planning may become, perhaps, at least a bit less wicked.

References

Abunnasr Y., & Infield, E. M. H. (2018), The green infrastructure transect: An organizational framework for mainstreaming adaptation planning policies. In Infield E. M. H., Abunnasr Y., Ryan R. L. (eds.) *Planning for Climate Change: A Reader in Green Infrastructure and Sustainable Design for Resilient Cities*. London, Routledge, pp. 184–194.

Agyeman J. (2005), *Sustainable Communities and the Challenge of Environmental Justice,* New York, New York University Press.

Albrechts L., Barbanente A., Monno V. (2020), Practicing transformative planning: the territory-landscape plan as a catalyst for change. *City, Territory and Architecture*, 7, 1, pp. 1-13.

Alexander D. E. (2013), Resilience and disaster risk reduction: An etymological journey, *Natural. Hazards Earth System Science*, 13, pp. 2707–2716.

Armiero M., Andritsos T., Barca S., Bràs R., Cayuela S.R., Dedeoğlu Ç., Pierri M. D, De Oliveira Fernandesisa L, Gravagno F., Greco L., Greyl L., Iengo I., Lindblom J., Milanez F., Pedro S., Pappalardo G., Petrillo A., Portaluri M., Privitera E., Sari A.C., Velegrakis, G. (2019), Toxic bios: Toxic autobiographies - A public environmental humanities project, *Environmental Justice* 12, 1, pp. 1-5.

Barbanente A. (2011), Un piano paesaggistico per la difesa dei beni comuni e uno sviluppo diverso [A landscape plan for the defense of common goods and a different development]. *Urbanistica*, 147, 60.

Batty M. (2013), *The new science of cities*, Cambridge, MIT press.

Beck U. (1992), *Risk Society: Towards a New Modernity*, New Delhi, Sage.

Berger A. (2006), Drosscape: Wasting land in urban America. *Landscape Journal*, 27, pp. 1–81.

Bergvall-Kåreborn B., Ståhlbröst A. (2009), Living Lab: An open and citizen-centric approach for innovation. *International Journal of Innovation and Regional Development*, 1, 4, pp. 356-370.

Blečić I., Cecchini A., Congiu T., Fancello G., Trunfio G. A. (2015), Evaluating walkability: A capability-wise planning and design support system. *International Journal of Geographical Information Science,* 29, 8, pp. 1350-1374.

Birkmann J., Cardona O.D., Carreño M.L., Barbat A.H., Pelling M., Schneiderbauer S., Kienberger S., Keiler M., Alexander D., Zeil P., Welle T. (2013), Framing vulnerability, risk and societal responses: The MOVE framework, *Natural Hazards*, 67, pp. 193–211.

Bonney R., Cooper C.B., Dickinson J., Kelling S., Phillips T., Rosenberg K.V., Shirk J. (2009), Citizen science: A developing tool for expanding science knowledge and scientific literacy. *BioScience*, 59, 11, pp. 977–984.

Braungart M., McDonough W. (2002), *Cradle to Cradle: Remaking the Way We Make Things*. New York, North Point Press.

Campagna M. (2014), Geodesign: Dai contenuti metodologici all'innovazione nelle pratiche [Geodesign: from methodological contents to innovation in practices], In: *XVII Conferenza Nazionale SIU. Società Italiana degli Urbanisti. L'urbanistica italiana nel mondo,* Planum Publisher, pp. 71-76.

Campagna M., Di Cesare A. E. (2016), Geodesign: Lost in regulations (and practice), in Papa R., Fistola R., Gargiulo C. (eds.) *Smart Energy in the Smart City*, Cham, Springer International Publishing, pp. 307-327.

Carrillo-Hermosilla J., del González P.R. and Könnölä T., (2009), Eco-innovations in practice. In*:* Carrillo-Hermosilla J., del González P.R. and Könnölä T. (eds.) *Eco-Innovation*, London, Palgrave Macmillan, pp. 125-196.

Cavalier D., Zachary E.K.G. (2016), *The Rightful Place of Science: Citizen Science*, Arizona State University, Consortium for Science, Policy, & Outcomes.

Cerreta M., Mazzarella C., Somma M. (2020), Opportunities and challenges of a geodesign based platform for waste management in the circular economy perspective. In: Gervasi O. et al. (eds)

Computational Science and Its Applications – ICCSA 2020. Lecture Notes in Computer Science, vol 12252. Springer Cham. pp. 317-331.

Cervellati P. L. (2000), *L'arte di Curare la Città [The Art of Taking Care of the City],* Milano, Società Editrice il Mulino.

Collard R., Harris L.M., Heynen N., Mehta L. (2018), The antinomies of nature and space, *Environment and Planning E: Nature and Space,* 1,1–2, pp. 3-24.

Corburn J. (2005), *Street Science: Community Knowledge and Environmental Health Justice,* Cambridge, MIT Press.

Crowther, P. (2005), Design for disassembly–Themes and principles, *Environment Design Guide*, pp. 1-7.

Cutter S.L., Barnes L., Berry M., Burton C., Evans E., Tate E., Webb J. (2008), A place-based model for understanding community resilience to natural disasters, *Global Environmental Change,* 18, pp. 598-606.

Dickinson J.L., Bonney R. (2012), *Citizen Science: Public Participation in Environmental Research*, NY United States, Cornell University Press.

Elliot K. C., Resnik D. B. (2019), Making open science work for science and society. *Environmental Health Perspectives*, 127, 7, pp.1-6.

Flaxman M., (2010), Fundamentals of geodesign, *Proc. Digital Landscape Architecture*. Anhalt University of Applied Sciences, 2, pp. 28–41.

Funtowicz S.O., Ravetz J.R (1990), *Uncertainty and Quality in Science for Policy*, Dordrecht, Kluwer Academic Publishers.

Galderisi A. (2018), The resilient city metaphor to enhance cities' capabilities to tackle complexities and uncertainties arising from current and future climate scenarios, in Galderisi A., Colucci A. (eds.) *Smart, Resilient and Transition Cities. Emerging Approaches and*

Tools for a Climate-Sensitive Urban Development, Cambridge, Elsevier. pp, 11-18.

Girardet H. (2014), *Creating Regenerative Cities*, London, Routledge.

Glasser, R. (2020), The climate change imperative to transform disaster risk management. *Internationa Journal of Disaster Risk Science*, 11, pp. 152–154.

Goodchild M. (2010), Towards geodesign. repurposing cartography and GIS? *Cartography Perspective*, 66, pp. 55 -69.

Huang L., Xiang W., Jianguo Wu, Traxler C., Huang J. (2019), Integrating GeoDesign with Landscape Sustainability Science, *Sustainability,* 11, 833, pp. 1-17

Indovina F. (2005), *Governare la Città con l'Urbanistica [Governing the City with Urban Planning.], Napoli,* Maggioli Editore.

Irwin A. (1995), *Citizen Science: A Study of People, Expertise, and Sustainable Development.* London, Routledge.

Jackson M., Lederwasch A., Giurco D. (2014), Transitions in theory and practice: Managing metals in the circular economy. *Resources* 3, 3, 516–543.

Kappes, M. S., Keiler M., von Elverfeldt, K., Glade, T. (2012), Challenges of analyzing multi-hazard risk: A review, *Natural Hazards*, 64, pp. 1925–1958.

Kennedy C., Cuddihy J., Engel -Yan. (2007), The changing metabolism of cities, *Journal of Industrial Ecology*, 2, pp. 43-59.

Kennedy C., Pincetl S., Bunje P. (2011), The study of urban metabolism and its applications to urban planning and design, *Environmental Pollution*, 159, 8-9, pp. 1965-1973.

Kreuter M. W., De Rosa C., Howze E.H., Baldwin G.T. (2004), Understanding wicked problems: A key to

advancing environmental health promotion, *Health Education & Behavior*, 31, pp. 441-454.

Levin K, Cashore B, Bernstein S., Graeme A. (2012), Overcoming the tragedy of super wicked problems: Constraining our future selves to ameliorate global climate change, *Policy Sciences*, 45, pp. 123–152.

Levin N., Leonelli S., Weckowska D., Castle D., Dupré J. (2016), How do scientists define openness? Exploring the relationship between open science policy and research practice, *Bulletin of Science, Technology & Society*, 36, 2, pp. 128–141.

Maragno D., dall'Omo C. F., Pozzer G., Bassan N., & Musco F. (2020), Land–sea interaction: Integrating climate adaptation planning and maritime spatial planning in the North Adriatic basin. *Sustainability*, 12, 13, 5319.

McGregor D., Simon D., Thompson D. (eds.) (2006), *The Peri-Urban Interface: Approaches to Sustainable Natural and Human Resource Use,* London/Stirling, VA, Earthscan.

McHarg I.L. (1969), *Design with Nature*, New York, Natural History.

Miller W. (2012), *Introducing Geodesign: The Concept,* Redlands, ESRI Press.

Musco F. (2016), *Counteracting Urban Heat Island Effects in a Global Climate Change Scenario*, London,Springer Nature.

Pachauri R. K., Allen M. R., Barros V. R., Broome J., Cramer W., Christ, R., Dubash N. K. (2014), Climate change 2014: Synthesis report. Contribution of Working Groups I, II and III to the fifth assessment report of the Intergovernmental Panel on Climate Change, *Geneva, IPCC.*

Pellow D. N. (2007), *Resisting Global Toxics. Transnational Movements for Environmental Justice*, Cambridge, MA, The MIT Press.

Pietrapertosa F., Salvi M., de Gregorio Hurtado S., D'Alonzo V., Church J. M., Geneletti D., Musco F., Reckien D. (2019), Urban climate change mitigation and adaptation planning: Are Italian cities ready? *Cities*, 91, pp. 93–105.

Pizziolo G., Micarelli R. (2003a), *Dai Margini del Caos l'Ecologia del Progettare [From the Margins of Chaos the Ecology of Planning]*, Firenze, Alinea Editrice.

Pizziolo G., Micarelli R. (2003b), *L'Arte delle Relazioni [The Art of Relations]*, Firenze, Alinea Editrice.

Pluchino P. (2019), *La città Vivente. Introduzione al Metabolismo Urbano Circolare [The Living City. Introduction to the Circular Urban Metabolism]*, Catania, Malcor D' edizione.

Rittel H.W., Webber M.M. (1973), Dilemmas in a general theory of planning, *Policy Sciences*, 4,2, pp. 155–169.

Russo M., Amenta L., Attademo A., Berruti G., Cerreta M., Formato E., Garzilli F., Mazzarella C., Vingelli F., Vittiglio V., Dąbrowski M. (2018), *REPAiR: REsource Management in Peri-urban AReas: Going Beyond Urban Metabolism: D5.3 Eco-Innovative Solutions,* Naples.

Secchi B. (2006), Progetto di suolo 2 [Soil design 2], In Aymonino A., Mosco V.P, (eds.). *Spazi Pubblici Contemporanei. Architettura a Volume Zero,* Milano, Skirà.

Silvestre J. D., De Brito J., Pinheiro M. D. (2014), Environmental impacts and benefits of the end-of-life of building materials–calculation rules, results and contribution to a "cradle to cradle" life cycle. *Journal of Cleaner Production*, 66, pp. 37-45.

Steiner F., Weller R., M'Closkey K., Fleming B. (2019) *Design with Nature Now*, Cambridge, United States, Lincoln Institute of Land Policy.

Steinitz C. (2012), *A framework for Geodesign. Changing Geography by Design.* Redlands,Esri Press, .

Stengers I. (2018), *Another Science is Possible. A Manifesto for Slow Science*, Cambridge, Polity.

Thomson G., & Newman P. (2018), Urban fabrics and urban metabolism: From sustainable to regenerative cities, *Resources, Conservation and Recycling*, 132, pp. 218-229.

UN Office for Disaster Risk Reduction (2015), *Sendai Framework for Disaster Risk Reduction 2015-2030*. [https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf].

UNECE (1998), *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.* Aarhus, Denmark. [https://www.unece.org/fileadmin/DAM/env/pp/documents/cep43e.pdf].

United Nations (2015), *Transforming Our World. The 2030 Agenda for Sustainable Development,* New York, United Nations, Department of Economic and Social Affairs.

United Nations (2019), *World Urbanization Prospects: The 2018 Revision* (ST/ESA/SER.A/420). New York: United Nations.

Vargas-Moreno J.C. (2010), GeoDesign: The emergence of a tight-coupling approach in GIS and spatial planning. *Planning and Technology*, 2010, pp. 6–7.

White G. F., Kate R. W., Burton I. (2001), Knowing better and losing even more: the use of knowledge in hazards management, *Environmental Hazards,* 3, pp. 81–92.

WHO - World Health Organization. (2010), *Parma Declaration on Environment and Health* . [http://www.euro.who.int/__data/assets/pdf_file/0011/78608/E93618.pdf].

WHO - World Health Organization. (2017), *Ostrava Declaration of the Sixth Ministerial Conference on Environment and Health.*

[http://www.euro.who.int/__data/assets/pdf_file/0007/341944/OstravaDeclaration_SIGNED.pdf].

Wolman A. (1965), The metabolism of cities. *Scientific American*, 213, 3, pp. 178-193.