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Toward 2030. The Role of Resilient and Sustainable Urban Planning to Foster a Greener Decade in Coastal Areas

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Abstract
Nowadays, more than 600 million people lived in coastal areas, outlooks forecast that they will be more than one billion by 2030. Cities occupy less than 2% of the world lands but are responsible for 70% of CO2 emissions. Coastal areas constitute the most exposed regions facing climate change impacts. This contribution aims at stimulating a reflection over the role that sustainable and resilient urban planning can have in fostering SDGs in coastal regions. Sustainable urban planning can constitute the trigger to reduce global impacts that cities generate on environment as well as resilient urban planning can contribute to make cities more safe, efficient and equitable to cope with threats deriving from global scale. This contribution argues that the practice of urban planning should definitively embrace a holistic and multi-scale approach, moving from geography to design, from the integrated coastal zone management to the urban design.
Keywords: Sustainable Urban Planning; Resilient Urban Planning; Integrated Coastal Zones Management; Waterfronts Regeneration Projects; SDGs.

1. Introduction

Over forty per cent of the world population lives in coastal areas exercising unprecedent pressures on the coastal and marine environment (Borgese, 1999). The interaction between different human activities and the coastal territories represents the basis of the growing stresses involving terrestrial and marine ecosystems. Moreover, the consequences of climate change constantly put at risk both, the balance of environment and the sustainability of the social and economic development of settled populations. During the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, the 172 governments and 2400 NGOs involved in the summit agreed to initiate an irreversible change in the world environmental governance, which should have been based on a greater sustainability of economic development models. Agenda 21 represents the Rio conference's final document; in defining an Agenda for the XXI Century, countries agreed to launch a global energy shift from fossil fuels to a greater use of renewable energies, a better water reserves management, as well as the reduction of the impacts on public health and the environment deriving from traffic and urban transport. This key document also represents the first international engagement to adopt the Integrated Coastal Zone Management (ICZM) as method to analyse, mitigate and solve conflicts between different uses and functions in these delicate ecosystems.
In 2010, for the first time in human history, most of the world's population lived in urban areas. According to a recent statement of the World Economic Forum, in 2020 at least 56,2% of the global population lives in cities; projections forecast that this portion will reach 69% by 2050 (Komeily and Srinivasan, 2015), and up to 90% of new urban dwellers will involves Asian and African cities. According to the UN Ocean Conference (UN, 2017) more than 600 million people lived in coastal areas, representing the 7.6% of the world population. Findings of a recent UN research demonstrate that, due to the economic benefits deriving from the proximity to the sea in terms of direct accessibility to commercial networks, tourism and fishing development, as well as economic and social relations, over 40% of human settlements it's located in the coastal areas. Outlooks forecast that by 2030 more than one billion people will live in coastal areas that were less than 10 meters above sea level (Neumen *et al*., 2015; Oppenheimer et al. 2019), representing not only the 12.7% of the world population but an increase of 67% in less than ten years, compared with the 7.6% recorded in 2017. Broadening the concept of coastal zone, including lands that go beyond 10 Km from the shoreline (usually the EU limitation of the coastal areas according to EUROSTAT, 2019) we can discover that nowadays 2.4 billion of people live within 1OO Km from the coastline, representing the 30% of the world population. Moreover, an increase of the number of dwellers living in coastal areas close to 70% in less than a decade confirm that this fast-paced urbanization process mainly involves the most vulnerable portions of citizens that are moved from rural to urban areas. Nowadays the future of sustainable development is even more tied to the planning and management of coastal areas.

2. Toward a greener decade

Internationally, ICZM is mainly used to support the territorial analysis of highly anthropized contexts, where human activities have created and stratified conflict between natural habitat and socio-economic growth. Over the last few decades, three main approaches to ICZM have emerged. The first was consolidated thanks to the practice of American geographers, for whom the ICZM must be used as a territorial planning approach to solves conflicts between different uses and functions, with the aim to protect the environment and ecosystems (Cicin-Sain B., Knecht R. W., 1998). The second one derives from the French geographer approach, interested in applying ICZM to coordinate different regional and urban planning rules, aiming at maximizing the efficiency of the coastal areas' transformation process (Mesnard André-Hubert, 2009). Based on the precious contribution of Professor Adalberto Vallega, the former President of the International Geographic Union, a third and useful approach was elaborated. Thanks to his applied research and critical reflections, he was able to define a new way to systematize the ICZM, aiming to integrating the tools of geographic analysis with those of urban and territorial planning (Vallega A., 1999). According to this approach, an in-depth knowledge of the interactions that occur between the activity of human groups and coastal systems (terrestrial and marine), may represents the key element for planning and managing the transformation of those territories safeguarding local cultural identities (Callegari F., Vallega A. 2002). The relevance of Vallega's contribution is represented by his structured meaning of the concept of integration: of disciplines and competences; between natural contexts and human activities; among multiscale territorial and urban planning laws. In referring to the ICZM, this paper mainly adopts the approach proposed by Adalberto.

The end of the use of fossil energy sources and the shift towards renewable sources, together with the global awareness of the existential risks for humanity caused by climate change, constitute the pillars of the new green paradigm. In this context, which is the role that town planners can play to support it by contributing to invert the un-sustainable development model, fostering a more sustainable decade? More precisely, what about the role that sustainable and resilient urban planning can have to achieve SDGs in coastal zones? In answering this question, this contribution aims to reflect on coastal regions and cities deserving innovative policies and strategies to implement sustainable and resilient actions trough resilient and sustainable urban planning and design.

Towns represent some of the greatest climate change generators, contributing with CO2 and GHG emissions (Ibrahim *et al*., 2012), as well as with their increasing ecological footprint (Rees and Wackernagel, 1996) and natural lands use consumption (Randolph, 2004). At the same time, being complex systems of social, economic and ecological factors (Liu *et al*., 2007), as well as due the constant increase of the severity of extreme weather conditions' consequences (UN-DRR, 2021), cities are the most vulnerable collectors of the impacts of climate change. Despite cities occupy less than 2% of the world lands, they produce more than 70% of CO2 emissions (FAO, 2014) and 80% of the global GDP. In pursuit of sustainable socio-economic development and environment protection, urban practitioners can contribute to cope on climate change, globally and locally. Since the development of urban areas has led to an acceleration of the phenomena underlying climate change, making them more sustainable may favour a slowdown of these phenomena. The benefits will be both for the environment and for citizens.

3. Sustainable and Resilient Urban Planning

While the first article on urban sustainability appeared in 1968 (Cain, 1968) and the first one approaching the theme of urban resilience was published five years later (Holling, 1973), these themes are emerged as a mainstream within the academia's debate starting from the beginning of the new millennium (Mobaraki & Oktay Vehbi, 2022; Zhang and Li, 2018). Scholars have opened new fields of investigation aiming at exploring the interlinkages between the future of cities and the sustainability of the current global development model. Nevertheless, during last decade a repositioning between the two research themes occurred. If in the first decade of the 21st Century scientific production was more focused on sustainability, over the last few years an inversion has taken place, bringing the theme of resilience as a main topic (ibidem). This circumstance confirms the feeling of urgency to explore new ways to make our territories more capable to cope with climate change. Urban practitioners are like seismographs, consequently the two key terms started to be used for labelling certain urban planning approaches.

Resilient Urban Planning (RUP) refers more to the planning process aiming at enhancing the capability of self-protection of an urban system, and his ability to cope with external turbulences. Sustainable Urban Planning (SUP) is mostly referred to the planning process aiming at investigating the relationships between human activities, use of natural resources and the protection of ecosystems to define sustainable development scenarios.

Considering the role that metro areas play in worsening the conditions of unbalanced global development the role that the SUP can play in modifying the current trend becomes evident. In fact, by acting locally, SUP could contribute to reduce and manage the impacts that the fast-paced growth of cities can globally generate on environment. Furthermore, the outcomes of numerous local sustainable actions could generate positive impacts at larger scale, contributing to invert the current un-sustainable development model. Likewise, by enhancing the operativeness and continuity of urban daily life also during critical situations, the RUP can make cities more safe, efficient and equitable,

contributing to cope with global threats deriving from climate change effects. As well as for the SUP, the results of various local resilient actions can generate positive impacts also on large scale.
In achieving the 11th SDG aiming at making cities and human settlements inclusive, safe, resilient and sustainable, urban planners and cities' stakeholder are facing the challenge to integrate preservation and innovation (Mieg and Töpfer, 2013) with sustainable and resilient urban planning.

4. Innovation and Preservation

Along with sustainable and resilient cities, innovation and preservation are at the center of the sustainable agenda. The first one is included in the 9th SDG, while the second one constitutes the core of the 15th SDG. Historically, cities with their milieu have represented the place where technological and social innovation have been made (Braudel, 1979; Crevoisier, 1999). Innovation in urban planning is crucial and involves both aspects. Technological innovations are more tied with tangible element such as energy, communications, transports, consumption, buildings. In order to enhance efficiency and reduce consumption of urban systems, innovative solutions are often embedded in the planning process. Novel approaches or tools may involve smart and georeferenced applications; IoT and Urban Big Data; green energy resources; transport systems and urban logistics; buildings' energy efficiency and infrastructures, just to name a few. Social innovations are related to intangible elements such as governance, participation, inclusion, organization and institutions. While technological innovation is mostly referred to the large or global scale, social innovation pertains to the local level. In fact, policies innovations tents to provide governance framework to reduce or mitigate climate change impacts and effects, enhancing sustainability and resilience (UN-Habitat, 2011).
If innovations allow to move forward the present of a society, placing it into the future, more than anything else preservation aims to ensure that what has been made available to a community by those who preceded can be passed on to future generations. Depending on the difference between languages, the term preservation tents to be used to indicate concepts and practices aiming at safeguarding and transfer over the time tangible and intangible heritage. Based on different approaches, preservation can be referred to the ecosystems, resources, landscapes, built environment, cultural heritage, citizens, institutions, traditions and ancestral knowledge just to name a few. Adopting an urban planning perspective preservation must aims at safeguarding historical urban contexts, health and citizens' wellbeing, natural environment and ecosystems as well as built environments, artistic and cultural heritage, all the elements that playing a key role in forging the identity of places and cities. From an urban-resilience approach, it imply the adoption of preservation' plans and measures able to guaranteeing the continuity of strategic infrastructure operations (tangible and intangible), to enhance risks reduction related to damage or loss of real estate assets, by fostering the continuity of economic activities to protect employment and dwellers daily life.
How to move from theory to practice? This contribution argues that, to foster sustainable and resilient urban planning, especially in the vulnerable contexts of coastal zones, town planners should definitively embrace a holistic and multi-scale approach, moving from integrated coastal zone management to urban design, trough sustainable and resilient urban planning. Thanks to a simultaneous and integrated use of analysis and managing tools deriving from geography and urban planning, coastal cities can be investigated, and masterplans can be designed.
Due the deeper interrelations that exist between climate change and human activities as well as among environment protection, and urban development, coastal cities are at the fore front to define innovative policies and sustainable actions. Since coastal zones, in developing and developed countries, constitute the most critical and delicate regions of the planet, the success of new development models involving these territories can produce beneficial long-lasting impacts, safeguarding populations and natural resources in different continents.
Thanks to the adoption of the integrated coastal zones management approach, the understanding of urban phenomena in coastal areas as well as the relationships between places and human activities are more relevant. There're two main circumstances supporting this assumption.
The first one is represented by the fact that, by integrating urban planning and geographic approaches, the analyses are conducted involving different dimensional levels: macro, urban, neighbourhood and micro. The second one derives from the fact that thanks to an interdisciplinary and holistic approach the opportunities and threats for the protection of coastal ecosystems and for the socio-economic development of urban and territorial context are more perceptible and searchable.
Definitely, and thanks to SUP and RUP, plans and actions can be adopted to improve the sustainability and resilience of cities, with respect to the effects of climate change, as well as to the impacts of human activities on built environment and ecosystems. More precisely, the results of the large-scale analyses are used as a basis to outline sustainable & resilient urban plans. Those plans aim at defining the evolution and growth of towns at an intermediate scale (urban and neighbourhood). In turn, these programs, can be implemented through Urban Design. Thus, resilient and sustainable solutions can be contextualized by designers. By operating at the small-scale, urban designer are able to control details, the choice of materials consistently with the genius loci. This process is proposed here to achieve concrete and lasting solutions to the global problems. Moving from ICZM analysis to the

implementation of sustainable and resilient plans, via sustainable and resilient urban design imply an in-progress sharing of findings, visions, programs, and goals form the large scale to the small one. In order to do not lose knowledge and goals, that must be transferred from urban planners to designers, is essential to ensure coherence among documents, from the most general to the most detailed. The more those documents will be informed by resilience and sustainability, the more the movement among different scales will be smooth and consistent.
To implement sustainable and resilient (urban) plans, punctual resilient and sustainable (urban) projects are required. In fact, while masterplans represent a vision of the future, the realization of projects makes them real and present. In this context, measures constitute the pivotal element based on which urban quality can be achieved (Parfect and Power, 1997), and sustainability and resilience can concretely transform urban landscapes (Ahern, 2013). In this contribution, I argue that the scales of one to one thousand, and one to five hundred represent the size around which it is possible to design and realize resilience and sustainability of public spaces, contributing to make places more resilient and sustainable. In that sense, urban planners – that generally are architects – represent the connecting link from large to small scale. From the territorial vision of geographers to the neighborhood and street point of view of designers, urban planners are the trait d'union not only between professionals but also between practices. For this reason, town planners can play the strategic role of "transferors of knowledge". From one side, the results of geographic analyses give substance to sustainable and resilient urban plans, from the other side, the contents of those plans will have to find a coherent synthesis within the Terms of References guiding the designers toward their implementation

5. Conclusions

Cities play a relevant role in feeding the phenomena underpinning climate change (Gordon D. J., 2013; Taylor, 2016). At the same time, they are directly affected by the consequences of climate change. Nowadays more than six hundred million people live in coastal zones, forecast outlook that they could be more than one billion before the end of this decade. Coastal environments in both side land and ocean, represent the most exposed ecosystems. In fact, sea levels rising, extreme marine phenomena together with inland water pollution and overfishing generate dramatic impacts on settled populations. In order to save lives and protect natural environments the definition and implementation of sustainable agendas for coastal zones is urgent.
In this context, sustainable urban planning (SUP) could contribute to reduce and manage the impacts that cities generate on environment and ecosystems globally. Hence, the outcomes of numerous local sustainable actions could generate positive impacts at larger scale, contributing to invert the current un-sustainable development model.
Likewise, the result of resilient urban planning (RUP) can improve the ability of a town to recover after an external impacting event like floods, droughts, heat waves, and extreme weather phenomena and/or to safeguard citizens lives and business activities.
Ultimately, until today the role of urban planners was to understand the relationships that exist between people's life and palaces, aiming to outline plans for territories and cities development. Increasingly, and based on the growing complexity of the urban phenomena, a deeper integration of the realms of geography, town planning and urban design is urgent. In that sense, urban planners are candidate to play a central role. As a knowledge's transferors they can link the large scale of geography with the small scale of urban design. New discussion can be launched, not only for an urban governance perspective, rather than for the content of the curricula that the students at the Schools of Architecture, Planning and Design must follows. Further investigation can be conducted to propose new ways to integrate the knowledge, vision and approaches of urban planners, with those of ecologists, landscape architects, urban designers, engineering and real estate expert. Scholars interested in discussing about the role of HEI can find new inspiration to reflect on how to forge a new generation of practitioners able to work adopting a multiscale and holistic approach aiming at contributing to solve critical issues in urban coastal context.

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Conflict of Interests

The authors declare no conflict of interest.

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