Antonio Leone Carmela Gargiulo
Editors

Environmental and territorial modelling for planning and design

INPUT TeMA*Lab* Dicea UniNa

Federico II Open Access University Press

fedOAPress

Università degli Studi di Napoli Federico II
Scuola Politecnica e delle Scienze di Base

Smart City, Urban Planning for a Sustainable Future

4

Environmental and territorial modelling for planning and design

Antonio Leone Carmela Gargiulo

Federico II Open Access University Press

Environmental and territorial modelling for planning and design editors Antonio Leone, Carmela Gargiulo - Napoli: FedOAPress. 2018. - (Smart City, Urban Planning for a Sustainable Future. 4).

Web link:
http://www.fedoabooks.unina.it

ISBN: 978-88-6887-048-5
DOI: 10.6093/978-88-6887-048-5

Università degli Studi di Napoli Federico II
Centro di Ateneo per le Biblioteche "Roberto Pettorino"
Piazza Bellini 59-60 - 80138 Napoli, Italy
http://www.fedoapress.unina.it

Published in Italy

Cover and graphic project: TeMA*LAB*

This book collects the papers presented at the 10th International Conference INPUT 2018 which will take place in Viterbo from 5th to 8th September. The Conferences pursues multiple objectives with a holistic, boundary-less character to face the complexity of today socio-ecological systems following a systemic approach aimed to problem solving. In particular, the Conference aims to present the state of art of modelling approaches employed in urban and territorial planning in national and international contexts.

This book is the latest scientific contribution of the "Smart City, Urban Planning for a Sustainable Future" Book Series, dedicated to the collection of research e-books, published by FedOAPress - Federico II Open Access University Press. The volume contains the scientific contributions presented at the INPUT 2018 Conference and evaluated with a double peer review process by the Scientific Committee of the Conference. In detail, this publication, including 63 papers grouped in 11 sessions, for a total of 704 pages, has been edited by some members of the Editorial Staff of "TeMA Journal", here listed in alphabetical order:

- Rosaria Battarra;
- Gerardo Carpentieri;
- Federica Gaglione;
- Rosa Anna La Rocca;
- Rosa Morosini;
- Maria Rosa Tremiterra.

The most heartfelt thanks go to these young and more experienced colleagues for the hard work done in these months. A final word of thanks goes to Professor Roberto Delle Donne, Director of the CAB - Center for Libraries "Roberto Pettorino" of the University of Naples Federico II, for his active availability and the constant support also shown in this last publication.

Rocco Papa
Editor of the Smart City, Urban Planning for a Sustainable Future" Book Series
Published by FedOAPress - Federico II Open Access University Press

Table of contents

Session 3 - Rural landscapes and well-being: towards a policy-making perspective

Session 4 - Smart planning

Session 5 - Maintenance, upgrading and innovation in cultural heritage

Session 6 - Urban and environmental planners: who is the client? The planners jobs in a new millennium

Session 7 - Big data and data mining

Session 8 - ICT & models: planning for communities

Special session 1: Did we learn lessons? Following the paths of Giovanni Rabino

Special session 2: Ecosystem-based and performance-based approaches for spatial planning

Special session 3: Geodesign

WHAT PLANNING FOR FACING GLOBAL CHALLENGES?

APPROACHES, POLICIES, STRATEGIES, TOOLS, ONGOING EXPERIENCES IN URBAN AREAS

GABRIELLA PULTRONE

Department of Architecture and Territory,
Mediterranea University of Reggio Calabria
e-mail: gabriella.pultrone@unirc.it
URL: http://www.unirc.it

How to cite item in APA format:
Pultrone, G. (2018). What planning for facing global challenges? Approaches, policies, strategies, tools, ongoing experiences in urban areas.
In A. Leone & C. Gargiulo (Eds.), *Environmental and territorial modelling for planning and design*.
(pp.572-587). Naples: FedOAPress. ISBN: 978-88-6887-048-5, doi: 10.6093/978-88-6887-048-5

ABSTRACT

Urban areas are an amalgam of socio-ecological systems, whose interactions between environment and human activities tend to become increasingly complex due to a series of determining factors, among which climate change is overwhelming. Given its negative environmental, economic and social effects, numerous initiatives, policies, strategies, and tools are being implemented at different territorial and institutional levels, sharing common ground in seeking to maximise the health and safety, resilience, inclusion, cohesion, sustainability and prosperity of cities to the benefit of all their inhabitants and simultaneously protecting and taking care of "our common home", i.e., the Earth. Indeed, cities have a key role in combating climate change as they can not only reduce their significant contribution to global GHG emissions, but also enjoy significant local benefits in terms of local economic development and job creation, in a process of transformation from energy-consuming organisms to renewable and circular cities. Therefore, an ecological approach cannot be limited to a series of urgent and partial responses to the immediate problems of pollution, environmental decay and depletion of natural resources. A cultural revolution, a distinctive way of thinking, educational programmes, lifestyles and spirituality are needed to generate resilience to risks by proposing innovative patterns of sustainable development, an integrated approach to urban and territorial planning, infrastructure and basic services. The case studies proposed in this article suggest innovative tools, plans and projects, lessons learnt, in which spatial and socio-economic planning processes are well coordinated and cross-sectoral.

KEYWORDS

Climate Change; Nature-based Planning; New Urban Agenda and SDGs; Sustainable Urbanization

1 AN INNOVATIVE APPROACH: SUSTAINABLE URBANIZATION BY LEARNING FROM NATURE?

The growing pace of urbanization and climate change are among the main challenges that governments around the world are facing, since many others are connected to them and the future of mankind and of the entire planet depends on their solution.

According to the United Nations-Economics & Social Affairs (2018), by 2030, the world is projected to have 43 megacities with more than 10 million inhabitants, most of them in developing regions. However, some of the fastest-growing urban agglomerations are cities with fewer than 1 million inhabitants, many of them located in Asia and Africa, and close to half of the world's urban dwellers reside in much smaller settlements with fewer than 500,000 inhabitants. As the world continues to urbanize, sustainable development depends increasingly on the successful management of urban growth. Therefore, integrated policies to improve the lives of both urban and rural dwellers are needed to strengthen the linkages between urban and rural areas and build on their existing economic, social and environmental ties. In fact, urban growth is closely related to the three dimensions of sustainable development: economic, social and environmental. Well-managed urbanization can help to maximize the benefits of agglomeration while minimizing environmental degradation and other potential adverse impacts of a growing number of city dwellers, ensuring, at the same time, that its benefits are shared and that no one is left behind.

In light of these first brief considerations, the article presents the development of a broader interdisciplinary research activity focused on the possible ways of implementing the *Sustainable Development Goals* (SDGs) and the *New Urban Agenda* at a local level, with particular reference to European cities and with an integrated approach in which urban and territorial planning plays a fundamental role, from the implementation of policies to the most recent and innovative planning and design experiences.

In the *New Urban Agenda* – adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III, 17-20 October 2016, Quito, EC) and endorsed by the United Nations General Assembly on 23rd of December 2016 – the United Nations (2017) recognize that "cities and human settlements face unprecedented threats from unsustainable consumption and production patterns, loss of biodiversity, pressure on ecosystems, pollution, natural and human-made disasters, and climate change and its related risks, undermining the efforts to end poverty in all its forms and dimensions and to achieve sustainable development. Given cities' demographic trends and their central role in the global economy, in the mitigation and adaptation efforts related to climate change, and in the use of resources and ecosystems, the way they are planned, financed, developed, built, governed and managed has a direct impact on sustainability and resilience well beyond urban boundaries".

The city is undoubtedly the most complex system that society has created and (Glaeser, 2011), above all in the scientific debate of the last decade, many scholars have tended to highlight its resemblance to an evolved biological organism, which lives thanks to delicate metabolic balances, feeds on matter, energy and information, metabolizes everything and produces goods, information and waste. Yet, there exists also a remarkable difference between the very long times of mutation/transformation of the evolved biological organisms (at least thousands of years) and the very rapid and continuous pace of the *organism-city.* This is the starting point to indicate viable ways to transform contemporary fossil cities into renewable cities. It is a sustainable transition where cities, minor urban settlements, rural territories and communities are the protagonists, because the local level can make the difference, implementing incisive actions in a short time and monitoring their effectiveness (Droege, 2008).

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

The most recent contributions by Gunter Pauli (2015) and Geoffrey West (2018) are grafted onto this trend, and considered significant both for the innovation of the approach and the ideas they offer in an integrated and interdisciplinary perspective, also for planning and design at all scales. The former, an entrepreneur and economist, is the founder of ZERI (Zero Emission Research Initiative), an international network of scholars, scientists and economists who designs new ways of production and consumption to successfully address global challenges at the local level.

In particular, in the huge mass of waste produced by the dominant economic model, stigmatized by Pope Francis himself in the Encyclical *Laudato si'* (2015), he sees an inexhaustible source of raw materials in cascade systems for local initiatives in a network with other interlocutors of the supply chain. The concept of *Blue Economy* (the Earth is also called the *Blue Planet*) he proposes ensures that ecosystems can maintain their ability to evolve allowing everyone to benefit from the flow of creativity, adaptation and abundance that is proper to Nature. The implementation of this concept at the urban scale implies new forms of governance capable of proactively adopting the concept of resilience, understood as the capacity of socio-ecological systems to absorb a disorder and to reorganize themselves while the change is taking place (Bologna, 2014; Pultrone 2017a).

Geoffrey West, a theoretical physicist, formerly director of the Santa Fe Institute (New Mexico), offers a fascinating and, in some ways, visionary perspective on the great global challenges. He integrates themes of biology, physics, mathematics, economics, and social sciences and dedicates a specific study to the cities and to the hypothesis of a new *city science* in what he defines the current phase of *Urbanocene*. It is a new frontier because it shows the urgency of understanding the city from a more scientific, physical and quantitative point of view. West (2018, p. 269) notes that, as far as their overall infrastructure is concerned, cities have much in common with organisms and ecosystems, but differ in a distinctive and almost enigmatic aspect: they metabolize energy and resources; produce waste; process information; grow, adapt and evolve; contract diseases; and develop phenomena that could be termed tumours or uncontrolled cell proliferations. Yet, unlike all the other biological organisms destined to aging and death, they challenge time and never die, with the exception of very few cases. The initial thought, on which his reflection is based, focuses on the true function of the city, almost a magic formula that, since the birth of the urban phenomenon in antiquity, has managed to facilitate the interaction between people contributing to the creation of cultural activities, to the exchange of ideas and wealth, to the growth of innovative thinking and the encouragement of entrepreneurship and cultural activities, offering itself as an environment full of favourable opportunities for all, whose dividend is an increase in the economy of infrastructural scale.

In the era of *Urbanocene*, it is therefore essential to raise the awareness that cities are much more than their physical infrastructure. They are catalytic facilitators where action takes place, the primary driving force of economic development in which challenges must be faced in real time and where the local administration seems to work better than the ever-increasing dysfunction of the nation-state. They are extraordinarily resilient and evolving organisms, complex adaptive systems, whose sustainability can be improved integrating nature and ecosystems with the urban metabolism and socio-economic activities (Pelorosso et al., 2018). Within the business community, there is a growing interest in and awareness of the value of managing and maintaining biodiversity and ecosystem services, as a business opportunity and as an essential means to reduce economic risks by ensuring the continued supply of vital resources. The large number of international, national, regional and local policy initiatives for the conservation and sustainable use of the natural environment are evidence of policy-makers' greater awareness of the importance of nature to society (EU, 2015).

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

2 CITIES AND URBAN PLANNING IN ACTION ON THE FRONTLINE

Based on what has been discussed so far, it is evident that if, on the one hand, increasing urbanization and agglomeration provide significant economies of scale for cities and regions, on the other, they can also lead to costs and externalities, such as those associated with noise, congestion and pollution, with related social and economic risks and a low level of life quality. Global challenges, such as climate change and resource depletion, affect different areas and sectors in various ways and require new and innovative responses. In this regard, the *World Bank's Eco^2 Cities: Ecological Cities as Economic Cities Initiative* – launched in 2010 as part of the World Bank's Urban and Local Government Strategy – is of particular interest since it pursues the objective to help cities in developing countries achieve a greater degree of ecological and economic sustainability (Suzuki et al., 2010). Its approach is shaped by an analysis of *best practices* in urban sustainability initiatives around the world (including Curitiba, Stockholm and Yokohama) and proposes the following four principles, which underlie the *Eco^2 framework* and have a general value, regardless of the geographical area, as they can be appropriately adapted and declined according to specific local contexts:

- principle 1, a city-based approach, which focuses on the need to enable and strengthen the leadership, capacity, and decision-making abilities of cities and their regional planning institutions. It also emphasizes the need to enhance the unique historic, cultural, and ecological resources of each city;
- principle 2, a platform for collaborative design and decision-making, which focuses on compounding the benefits of urbanization by leveraging and combining the unique capacities and resources of all stakeholders. It supports an inclusive and fair process of urban development and decision-making that involves and empowers all stakeholders;
- principle 3, a one-system approach, which strives to create a "resource regenerative and multifunctional" city. Sectors, policies, and budgets — as well as natural and man-made systems — need to work together across spatial scales and administrative jurisdictions so that the city works effectively as one system;
- principle 4, an investment framework that values sustainability and resilience, focuses on broadening the scope and extending the timeframe within which policies, plans, and investment options are assessed for costs, benefits, and risks. It supports decision-making approaches that value natural, cultural, and social capital.

Therefore, this city-based approach enables local governments to lead a development process that takes into account their specific circumstances, including their ecology, and to realize the benefits of integration by planning, designing, and managing the whole urban system in the long term.

In this wide and complex context, Urban and Territorial Planning plays a particularly significant and decisive role. It can be defined as "a decision-making process aimed at realizing economic, social, cultural and environmental goals through the development of spatial visions, strategies and plans and the application of a set of policy principles, tools, institutional and participatory mechanisms and regulatory procedures" (UN-Habitat, 2015). Furthermore, it has an inherent and fundamental economic function as a powerful instrument for reshaping the forms and functions of cities and regions in order to generate endogenous economic growth, prosperity and employment, while addressing the needs of the most vulnerable, marginalized or underserved groups.

While there are valuable lessons learnt from many cities all over the world, the *International Guidelines on Urban and Territorial Planning (Guidelines)*, published by the United Nations (2015), aim at filling a critical gap by providing a reference framework for planning that is useful across a range of scales and adaptable to

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

distinct regional, national and local contexts. In order to strengthen the urban and territorial dimensions of the development agendas of national, regional and local governments, they present twelve principles that could guide decision-makers in developing or revising policies, plans and designs through an integrated planning approach (UN-Habitat, 2015).

The *Guidelines* promote key urban and territorial planning principles and recommendations that can assist all countries and cities to effectively guide urban demographic changes (growth, stagnation or decline) and improve the quality of life in existing and new urban settlements. Taking into account the principle of subsidiarity and the specific governance arrangements of each country, they can be used through the multiscale and transcalar continuum of spatial planning, at all territorial and institutional levels (supranational and transboundary, city-region and metropolitan, city and municipality up to district and neighbourhood level).

Then, urban and territorial planning is considered an essential investment in the future, a precondition for a better quality of life and successful globalization processes that respect the cultural heritage and cultural diversity. It provides a spatial framework to protect and manage the natural and built environment of cities and territories, including their biodiversity, land and natural resources, and to ensure integrated and sustainable development. Moreover, it contributes significantly to strengthening environmental and socio-economic resilience, enhancing mitigation of, and adaptation to, climate change and improving the management of natural and environmental hazards and risks (UN-Habitat, 2015).

At a European level, the Urban Agenda for the EU is part of the EU's commitment to contributing to the implementation of both the *New Urban Agenda* (Habitat III) and the *2030 Agenda for Sustainable Development*, above all Goal 11 'Make cities inclusive, safe, resilient and sustainable'.

In this regard, sustainable urban planning with nature-based solutions has positive environmental, social and economic impacts and should be integrated into all relevant political strategies and action plans. It provides opportunities for adaptation to climate change, thus increasing urban resilience to risks, such as droughts, floods and heatwaves, as well as opportunities for small-scale climate mitigation through increased carbon storage. It can also reduce pressure on peripheral natural areas. For example, wastewater can be treated closer to residential sources and provide satisfactory near-home recreation opportunities that diminish the need to travel for contact with nature (UN-Habitat, 2015). Project managers and experts working in the field of nature-based projects have identified several success factors which are relevant to such projects, from the planning, through the conception, to the implementation and maintenance phases, namely: building a strong network of actors, weaving and maintaining regular and effective public relations with specific stakeholder groups, being transparent and building trust, and being open to new ideas and approaches.

In this direction, *The Green City* initiative, established in different European countries, aims at promoting the societal and economic values of urban greenery as natural infrastructure that adds to the quality of the living climate, to urban biodiversity, and to human health and wellbeing, encouraging stakeholders to work together at an international level in the implementation of green solutions. *The Green City Foundation* is, in fact, a platform to exchange scientific initiatives, and a network to facilitate research, design, creation and maintenance of green spaces. The *Urban Nature Atlas* (https://naturvation.eu/atlas) contains almost 1000 examples of Nature-Based Solutions from across 100 European cities, each associated with the key challenges they are facing, the urban settings, sources of financing and related costs. Among these, *Pilestredet Park* is one of the largest urban ecology projects in Scandinavia that includes the redevelopment of a neglected inner-city quarter of Oslo while meeting high standards of sustainable construction. Moreover, it includes energy efficient buildings with high quality indoor environments, plenty of green areas, as well as

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

an extensive stormwater runoff management system for the whole site. *Pilestredet Park* also contributes toward the development of more sustainable construction techniques and products, thanks to the strict requirements from the Environmental follow-up programme developed by the Norwegian Directorate of Public Construction and Property (Statsbygg) and Oslo Municipality.

Fig. 1 Oslo, *Pilestredet Park*. The site where the old Rikshospitalet stood is being transformed to a green area with dense housing development

Fig. 2 *Pilestredet Park*..The development process is ecologically oriented, includes environmentally friendly use of material, low energy consumption,

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

In the city of Sheffield (South Yorkshire, England), the *Grey to Green Corridor* is an interesting project to transform Sheffield's Riverside Business District, which has turned 'grey' redundant road space into 'green' flower meadows and wetlands in a growing business and living area, transforming 1.3 kilometres of redundant roads into attractive new linear public spaces. This will eventually include innovative perennial flower meadows, an interlinked sustainable urban drainage system (SUDS), rain gardens, public art and high quality paved footways and street furniture. It is also a key step towards expanding the boundary of the Sheffield City Centre back to its historic origins around the River Don. The project will create an attractive setting for existing and new investment and jobs, an improvement in the city's resilience to climate change as well as an enhanced public realm and connectivity of the area with the rest of the City Centre. It also shows off new forms of partnership with the University of Sheffield Landscape School, Amey and Robert Bray Associates by sharing expertise to solve problems in an innovative way. For its quality and innovation, it received national recognition and a number of awards in 2016.

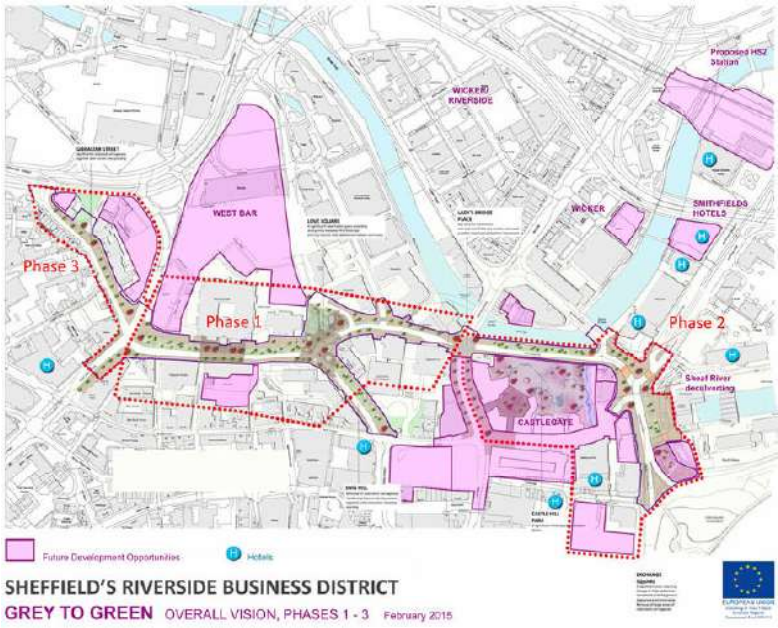
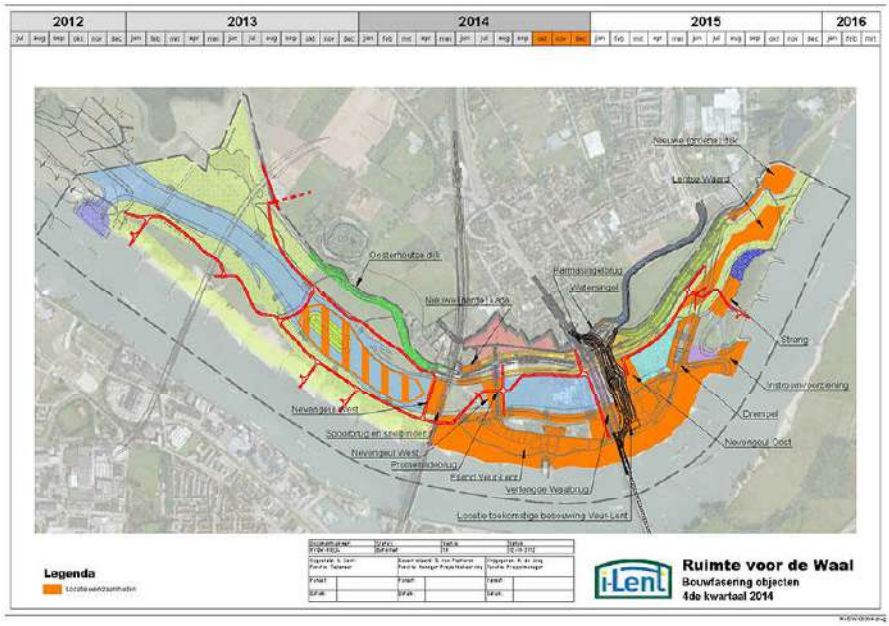


Fig. 3 The *Grey to Green* project is the UK's largest retrofit SUDS scheme

In the Netherlands, the *Room for the river project* is the expression of a new strategy that provides an alternative to the traditional solution to build ever higher dams, which, however, are not sufficient to protect cities from flooding risk. It implies making more space for water to better prevent floods by lowering the level of high water and to offer spatial quality to the area reconnecting people and rivers. Some measures of this plan are nature-based solutions. The city of Nijmegen is one of the areas where the programme took place. It was built on the south bank of the Waal river; on the opposite side of the river, the city of Lent was protected by a dike which contributed to narrowing the river to form a bottleneck prone to flooding. The project involved two main measures: relocating the dike 350 meters inland and digging an ancillary channel

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

in the floodplain enabling the creation of a new island. Both actions will make more space for the river and for nature.



Figg. 4 - 5 Nijmegen. *Room for the river project* will create an island in the Waal and a unique urban river park

These developments have increasingly required indicators, standards and frameworks to guide urban sustainability policy, planning and implementation. Eco-city and SDGs indicators, standards and frameworks

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

variously act as interventions in governing processes for urban sustainability and constitute a specific field of research worth of further development and analysis (Joss, 2012; Mulholland et al., 2018).

3 CONCLUSION: SHARED PATHS FOR SUSTAINABLE CITIES IN HARMONY WITH NATURE

The challenges of climate change and unprecedented urbanisation are crucial factors that involve a plethora of actors (cities, national governments, international organisations, private developers, technology firms) in conceptual, policy and practical innovation, as the key to sustainability lies in the concept of *green cities* or *eco cities* (UNEP, 2012). These can be considered as umbrella terms that covers various notions of, and approaches to, sustainable urbanism, bringing together multiple forms of sustainable development applied at different urban scales and locally contextualised, similarly to what happens for the sister terms of climate-neutral city, low-*carbon city*, *smart city*, *sustainable city*, *transition towns*, among others.

The fundamental interconnections between humanity and nature lead to the urgent need to inspire citizens and societies to reconsider how they interact with the natural world and the importance of the implementation of the *2030 Agenda* (United Nations General Assembly, 2016).

As repeatedly mentioned before, urban areas are an amalgam of socio-ecological systems, whose interactions between environment and human activities tend to become increasingly complex, mainly due to a series of determining factors, among which climate change is overwhelming. Given its negative environmental, economic and social effects, numerous initiatives, policies, strategies, tools are being implemented at different territorial and institutional levels, sharing common ground in seeking to maximise the health and safety, resilience, inclusion, cohesion, sustainability and prosperity of cities to the benefit of all their inhabitants, protecting and taking care, at the same time, of "our common home", *i.e.*, the Earth (Pope Francis, 2015). A holistic worldview, rooted in the respect for Nature and in the interdependence of humankind and the Earth, is also needed, as humanity, which is inextricably part of the community of life on Earth, cannot continue to override the laws that maintain the homeostatic balances of the Earth system. Under these conditions, the rational *homo economicus* imperatives of profit maximization, control of the market, consumption and accumulation of material goods, which give rise to a short-sighted short-term gain goal for the few, is no longer acceptable.

Indeed, cities have a key role to play in combating climate change as they can not only reduce their significant contribution to global GHG emissions, but also enjoy significant local benefits in terms of local economic development and job creation, in a process of transformation from energy-consuming organisms to renewable and circular cities, as the *Urban Agenda for the EU Circular Economy Draft Action Plan* (Partnership on Circular Economy, 2018) also states.

Considering the human roots of the global crisis, an ecological approach cannot be reduced to a series of urgent and partial responses to the immediate problems of pollution, environmental decay and depletion of natural resources. A cultural revolution, a distinctive way of thinking, policies, educational programmes, lifestyles and spirituality, which may generate resilience to risks by proposing innovative patterns of sustainable development, integrated approach to urban and territorial planning, infrastructure and basic services, are needed and cannot be delayed anymore (Pultrone 2017b, 2019). It is not enough to guarantee the quantity of urban standards and facilities in the absence of adequate attention to environmental, qualitative aspects and performances, useful to generate public value, and to the interaction with individuals who must be enabled to exercise their right to the city.

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

Planning allows combining climate change mitigation, adaptation, disaster risk reduction, biodiversity conservation, and sustainable resource management (Bundesamt für Naturschutz - EcoLogic, 2014).
This is what emerges from the proposed case studies, suggesting innovative tools, plans and projects, lessons learnt, in which spatial and socio-economic planning processes are well coordinated and cross-sectoral. They document the real possibility – also recognized in the well-known document *The Future we want* (United Nations, 2012) – that, if well planned and developed, including through integrated planning and management approaches, cities can promote economically, socially and environmentally sustainable societies. Last but not least, an effective implementation and evaluation of urban and territorial planning requires continuous monitoring, periodic adjustments and sufficient capacities at all levels, as well as sustainable financial mechanisms and technologies, in order to offer effective opportunities of life in harmony with nature also in all urban areas, from the central to the most peripheral ones.

REFERENCES

Bologna, G. (2014). Il governo della sostenibilità tra planetary boundaries e resilienza. In Worldwatch Institute, *Governare per la sostenibilità* (pp. 7-18). Milan, IT: Edizioni Ambiente. ISBN: 9788866271482

Bundesamt für Naturschutz – EcoLogic. (2014). *The challenge of climate change. Nature-based approaches for climate change mitigation and adaptation*. Bonn, D: German Federal Agency for Nature Conservation. Retrieved from https://www.ecologic.eu/sites/files/publication/2014/eco_bfn_nature-based-solutions_sept2014_en.pdf

Droege, P. (2008). *La città rinnovabile. Guida completa ad una rivoluzione urbana*. Milano, IT: Edizioni Ambiente. ISBN: 9788889014707

EU (2015). *Towards an EU Research and Innovation policy agenda for Nature-Based Solutions & Re-Naturing Cities*. Retrieved from https://ec.europa.eu/programmes/horizon2020/en/news/towards-eu-research-and-innovation-policy-agenda-nature-based-solutions-re-naturing-cities

Glaeser, E. (2011). Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier. New York, USA: Penguin Press. ISBN: 9780143120544

Joss, S. (Ed.) (2012). Tomorrow's City Today: Eco-City Indicators, Standards & Frameworks. Bellagio Conference Report. London, UK: University of Westminster. Retrieved from https://www.ioer.de/fileadmin/internet/veranstaltungen/2013/Bellagio_Spreads_PDF_Version__28.1.13-1.pdf

Mulholland, E., Dimitrova, A., Hametner, M. (2018). *SDG Indicators and Monitoring: Systems and Processes at the Global, European, and National Level. ESDN Quarterly Report, 48, April 2018*. Vienna, A: ESDN Office. Retrieved from https://www.sd-network.eu/quarterly%20reports/report%20files/pdf/2018-April-SDG_Indicators_and_Monitoring.pdf

Pauli, G. (2015). *Blue Economy*. Milan, IT: Edizioni Ambiente. ISBN: 9780912111902

Pelorosso, R., Gobattoni, F., Ripa, M.N., Leone, A. (2018). Second law of thermodynamics and urban green infrastructure. A knowledge synthesis to address spatial planning strategies. *TeMA. Journal of Land Use, Mobility and Environment, 11*(1), 27-50. doi: http://dx.doi.org/10.6092/1970-9870/5326

Pope Francis (2015). *Laudato si'. Lettera enciclica sulla cura della casa comune*. Città del Vaticano: Libreria Editrice Vaticana. ISBN: 9788821594250

Pultrone G. (2017a). La sfida ecologica: da crisi ad opportunità per un cambio di paradigma nella cultura della pianificazione. *Paper presented at the XXXVIII AISRe Conference, Cagliari, 20-22 September 2017*. Retrieved from https://www.aisre.it/images/aisre/599de3889eb5b3.43427062/Pultrone.pdf

Pultrone, G. (2017b). Città al centro della 'rivoluzione circolare?. *Urbanistica Informazioni, 272*, 303-307.

Pultrone, G. (2019). The Ecological Challenge as an Opportunity and Input for Innovative Strategies of Integrated Planning. In F. Calabrò, L. Della Spina and C. Bevilacqua (Eds.). *International Symposium on New Metropolitan*

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

Perspectives (pp. 691–698). Cham, CH: Springer International Publishing AG. doi: https://doi.org/10.1007/978-3-319-92102-0_75

Suzuki H., Dastur A., Moffat S., Yabuki N., & Marayuma H. (2010). *Eco2 Cities. Ecological Cities as Economic Cities*. Washington, USA: The Word Bank. Retrieved from http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1270074782769/Eco2_Cities_Book.pdf

UNEP (2012). *21 Issues for the 21st Century. Results of the UNEP Foresight Process on Emerging Environmental Issues*. Nairobi, KE: United Nations Environment Programme.

UN-Habitat (2015). *International Guidelines on Urban and Territorial Planning, approved by the Governing Council of UN-Habitat in its resolution 25/6 of 23 April 2015*. Nairobi, Ke: United Nations Human Settlements Programme. Retrieved from https://unhabitat.org/books/international-guidelines-on-urban-and-territorial-planning/

United Nations (2012). *The future we want. Outcome document of the United Nations Conference on Sustainable Development Rio de Janeiro, Brazil, 20–22 June 2012*. Rio de Janeiro, BRA: United Nations. Retrieved from https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf

United Nations General Assembly (2016). *Harmony with Nature*. New York, USA: United Nations.

United Nations (2017). *New Urban Agenda*. New York, USA: United Nations. Retrieved from http://habitat3.org/wp-content/uploads/New-Urban-Agenda-GA-Adopted-68th-Plenary-N1646655-E.pdf

United Nations-Economics & Social Affairs (2018). *World Urbanization Prospects. The 2018 Revision*. Retrieved from https://population.un.org/wup/Publications/Files/WUP2018-KeyFacts.pdf

Partnership on Circular Economy (2018). *Urban Agenda for the EU Circular Economy DRAFT ACTION PLAN*. Retrieved from https://ec.europa.eu/futurium/en/system/files/ged/ua_ce_draft_action_plan_-_final_09.02.2018.pdf

West G. (2018). *SCALA. Le leggi universali della crescita, dell'innovazione, della sostenibilità e il ritmo di vita degli organismi, delle città, dell'economia e delle aziende*. Milan, IT: Mondadori. ISBN: 9788804687146

IMAGES SOURCE

Cover image: Sheffield. Grey to Green. https://www.sheffield.ac.uk/landscape/news/grey-to-green-nigel-dunnett-sheffield-design-awards-1.658042

Figg. 1-2: STATSBYGG. Pilestredet Park – a tale of sustainable urban development.

https://www.statsbygg.no/files/prosjekter/pilestredetPark/PP_brosjyreEng.pdf

Fig. 3: Grey to Green Sheffield project. http://www.greytogreen.org.uk/phase2.html

Figg. 4-5: Room for the river. http://www.ruimtevoordewaal.nl/en/room-for-the-river-waal

AUTHOR'S PROFILE

Gabriella Pultrone is an architect, Ph.D., Assistant professor in Urban Planning at the Department Architecture and Territory-dArTe, University Mediterranea of Reggio Calabria, where she teaches Urban Planning and Design and is member of the Teaching Body the Research Doctorate in Architecture and Territory. She carries out research activities focussing on planning, her areas of interest include: the cultural identity of the Mediterranean Basin, with particular reference to its urban settlements and its territorial organization; Relations between cultural heritage, tourism and local development; Smart Cities and Communities; Urban and Territorial Planning for the implementation of Sustainable Development Goals (SDGs).

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5

Antonio Leone is full professor of Environmental and Territorial Engineering at the Tuscia University. Degree in Civil Engineering. Member of the Teaching College PhD "Land and Urban Planning" at Politecnico di Bari and "Environment and landscape design and planning" at Sapienza University of Rome. Participant and responsible in several projects financed by the European Union within 5th Framework Programme, Interreg IIIB Research Program, COST-actions, LIFE programme and other national and regional research programs (e.g. Nature 2000 sites). Member of Scientific International Committee for Metropolitan Strategic Master Plan "Terra di Bari". Author of about 150 papers and scientific articles on the main international journals related to the management of the environment and landscape and to the engineering of the territory, for the most part of which he also carries out the activity of an anonymous reviewer.

Carmela Gargiulo is full professor of Urban Planning Techniques at the University of Naples Federico II. Since 1987 she has been involved in studies on the management of urban and territorial transformations. Since 2004, she has been Member of the Researcher Doctorate in Hydraulic, Transport and Territorial Systems Engineering of the University of Naples "Federico II". She is Member of the Committee of the Civil, Architectural and Environmental Engineering Department of the University of Naples "Federico II". Her research interests focus on the processes of urban requalification, on relationships between urban transformations and mobility, and on the estate exploitation produced by urban transformations. On these subjects she has co-ordinated research teams within National Project such as Progetto Finalizzato Edilizia - Sottoprogetto "Processi e procedure" (Targeted Project on Building – Subproject "Processes and procedures), from 1992 to 1994; Progetto Strategico Aree Metropolitane e Ambiente, (Strategic Project Metropolitan Areas and Environment) from 1994 to 1995; PRIN project on the "Impacts of mobility policies on urban transformability, environment and property market" from 2011 to 2013. Scientific Responsible of the Project Smart Energy Master for the energy management of territory financed by PON 04A2_00120 R&C Axis II, from 2012 to 2015. She is author of more than 130 publications.

ISBN:978-88-6887-048-5
DOI:10.6093/978-88-6887-048-5