TeMA

Journal of Land Use, Mobility and Environment

The climatic, social, economic and health phenomena that have increasingly affected our cities in recent years require the identification and implementation of adaptation actions to improve the resilience of urban systems. The three issues of the 15th volume will collect articles concerning the challenges that the complexity of the phenomena in progress imposes on cities through the adoption of mitigation measures and the commitment to transforming cities into resilient and competitive urban systems.

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The cover image shows the Irpinia hills at sunset, highlighting the enhancement of two renewable energy sources: sun and wind.
The photo was taken by Giuseppe Mazzeo in August 2022, in S. Andrea di Conza, Avellino, Italy.

TeMA. Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include: engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science and complex systems.
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Contents

353 EDITORIAL PREFACE
Rocco Papa

FOCUS

355 **Assessing territorial vulnerability**
Simone Beltramino et al.

377 **Resilient marginal cities by encouraging intermodality strategies**
Irina Di Ruocco

LUME (Land Use, Mobility and Environment)

397 **How urban food gardening fits into city planning**
Anna Forte, Enrico Gottero, Claudia Cassatella

415 **Landscape and the city**
Donatella Cialdea, Antonio Leone, Vito Muscio

431 **Travel mode choice and its responsiveness to the needs of commuters with disability in the Accra Metropolitan Assembly**
Odame Prince Kwame

447 **Circular living. A resilient housing proposal**
Emanuela Braì, Giovanna Mangialardi, Domenico Scarpelli

471 **Landscape and urban planning approach within regional spatial planning system. Case study of Moscow oblast'**
Elina Krasilnikova, Alesya Goncharik

487 **Buffer areas for sustainable logistics**
Ilaria Delponte, Valentina Costa, Ennio Cascetta, Armando Cartenì, Flavia Scisciot

501 **Climate variation in metropolitan cities**
Ginevra Balletto, Martina Sinatra, Roberto Mura, Giuseppe Borruso

517 **Energy saving and efficiency in urban environments: integration strategies and best practices**
Carmen Guida

COVID-19 vs CITY

533 **The weapons of the city against pandemic assaults**
Maria Angela Bedini, Fabio Bronzini

REVIEW NOTES

543 **Climate adaptation in the Mediterranean: storms and droughts**
Carmen Guida, Stella Pennino

549 **Accelerate urban sustainability through policies and practices on the mobility system in Italy**
Federica Gaglione, David Ania Ayiine-Etigo

555 **Planning for sustainable urban mobility in Italy. Insights from Palermo and Cagliari**
Gennaro Angiello

561 **Sustainable cities and communities: the cost of pursuing SDGs**
Stefano Franco

565 **The interventions of the Italian Recovery and Resilience Plan: tourism for more competitive cities**
Sabrina Sgambati

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REVIEW NOTES – Urban planning literature review

Climate adaptation in the Mediterranean: storms and droughts

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Abstract

Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. This section of the Journal, Review Notes, is the expression of a continuous updating of emerging topics concerning relationships between urban planning, mobility and environment, through a collection of short scientific papers written by young researchers. The Review Notes are made of four parts. Each section examines a specific aspect of the broader information storage within the main interests of TeMA Journal.
In particular, the Urban planning literature review section aims at presenting recent books and journals, within global scientific panorama, on selected topics and issues.
This contribution aims at delving into the most severe effects due to storms and droughts and presenting three interesting and significant scientific books and journal that present effective adaptation strategies to limit climate crisis and improve Mediterranean resilience towards more frequent and severe storm surges and droughts. The third contribution of the Review Notes for TeMA vo. 15 highlights the need for integrated action to address the climate crisis in the Mediterranean region, bringing together the strengths and weaknesses of its shores, despite social, economic and political differences. Moreover, the extreme weather events that are occurring throughout Europe, from the south to the north, show how the Mediterranean area is particularly sensitive to climate change-related events.

Keywords

Climate Change; Floods; Droughts; Mediterranean.

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1. Introduction

When it's time to sum up the achievements, facts and data for the end of the year, climate change and its dynamics must not be saved. The 2022 year seems to have collected several unfortunate records on that side. According to NASA, planet Earth just experienced one of its warmest years on record. Hot weather baked the globe, with Europe and China both recording their warmest meteorological summers and poorest rain seasons. In particular, no continent is experiencing hot weather (and related climatic and meteorological phenomena) as Europe. Although a significant reduction of greenhouse gases emission has been recorded, average temperatures increased at double pace than global average. After a slight increase during 2021, accomplice the post-pandemic economic recovery, equivalent CO_2 emissions decreased about 5%, on average, compared to the emissions of the previous year. This issue was definitely influenced by Ukraine-Russian war and consequent energy crisis that produced, as effects, a general decrease of carbon consumptions, domestic and industrial, and ongoing transitions to renewable energy sources.

The knowledge frame outlined so far about Mediterranean cities and their exposition and vulnerability to cope with climate change effects justify the recently published remarks of MedECC (Mediterranean Experts on Climate and Environmental Change) report, which states that, with more that 500 million inhabitants, Mediterranean cities are the second most affected region, after the Artic (Miranda et al., 2020). For what concerns the focus of this issue, different climatic scenarios agree that, by 2050, Mediterranean cities will experience a reduction of 10% of water sources, which will result in a more precarious food security. Predictive models compute an increase in intensity and frequency of climatic extreme events: droughts and floods are on the top of the list, as also shown by the unfortunate events recorded during 2022 (Gargiulo & Lombardi, 2016; Amponsah et al., 2020; World Meteorological Organization, 2022). Long-term projections are even more dramatic: by 2100, with an expected increase of temperature close to 6°C, increases of 20% reduction of rainfalls and 100% of land interested by wildfires are foreseen. Although the conclusions produced by different climatic models may differ a lot, nearly all of them agree that the Mediterranean region would suffer of an intense desertification process, due to a decrease of rainfall precipitations close to 40% in some areas, especially during winter seasons. Climate changes would generally produce a temperature increase but, unlike in other regions, where warming will result in more frequent storms, for Mediterranean coastal cities there will be an exception to the rule. But no exception seems to occur when it comes to recorded climatic data for cities that have already been experiencing water shortage for years (Bucchignani et al., 2018). In fact, the numbers summed up in this contribution will worsen the already critical water deficit, also due to pollution, poor management of resources and significant population increase. Water and related urban systems play a key role migrating impacts of climate change to local economies and societies. In fact, international scientific literature agrees that urban vulnerability to such phenomena is closely connected to socio-economic conditions of interested areas. Also floods, surges and storms, that would be more intense and frequent, will provoke further damages to water networks and storage infrastructures, unlike what has been commonly thought (Balaban & Şenol Balaban, 2015). The Urban Planning Literature Review section of Review Notes for TeMA Journal vol. 15 focuses on the effects of climate change-related phenomena for Mediterranean coastal cities, as hot-spot case studies in terms of exposure, vulnerability and resilience. The first two issues presented the main features, strengths and weaknesses of mare nostrum cities in their ability to cope with global warming and extreme natural events. In particular, the second contribution highlighted the impact of extreme heat waves on urban environments. As undeniable consequence of global warming, this current review note concerns the effect and storms and droughts for Mediterranean cities, through a review of the scientific literature and three interesting and recent books and reports.

For this issue, two books and a report, recently published, have been investigated. The first two books concern the development of adaptation strategies to floods and drought. Their approach to the matter is holistic and they both promote the integration of adaptation solutions from different points of view. The latter is a technical

report, developed and published by C40 to increase awareness among policy-makers and professionals and disseminate knowledge about potential solutions and interventions, according to 2050 scenarios.

2. Approaches to adapt cities to storms and droughts

Plans and strategies designed to improve water management and reduce flood and drought-related risks often focus on technological issues (hydraulic or grey engineering). Such approach ignores all environmental, ecological, socioeconomic and political features that significantly influence the impacts of extreme climatic events, as well as the vulnerability of threatened communities. Given that it is not possible to fully control the occurrence of these events, stakeholders, decision-makers, entrepreneurs and citizens should focus their resources on increasing the resilience of the cities where they live (Tulisi, 2017). The management of urban floods and drought events has directly and explicitly to do with the supply of drinkable water, with the disposal of sewage, controlling the quantity of rainfall and the effects of precipitations of water quality.

Given the complexity of urban systems and the multitude of physical and functional elements upon which these phenomena have effects, the design of integrated plans and strategies to mitigate and adapt cities sounds a necessary action. In this regard, the World Meteorological Organization (WMO) identified four possible approaches in order to design good practices of resilience and adaptation and to integrate them in urban planning tools (2012).

The first approach is hazard-based and focuses on the physical, infrastructure and technology features of urban environment in order to manage floods and eventual water shortage, in case of extended droughts. Climate adaptation of cities through this approach means matching the design features and the management and disposal capabilities to actual rainfall. Critical infrastructure may be reinforced or suitably sized in order to satisfy changing requisites. In case improving interventions are not possible or not economically convenient, adaptive non structural elements may be integrated, as a mean to reduce even residual risks.

A second approach, based on vulnerability, encourages to limit the vulnerability of exposed population, taking into account economic activities and development degree of urban areas (Papa et al., 2014).

The vulnerability-based approach involves limiting the vulnerabilities of the affected population by considering the economic activities and degree of development of the areas, the intensity and frequency of flooding or drought events, land consumption, and the expected impacts on the development of activities and community demand for essential resources.

Vulnerability conditions can be improved through economic development strategies that are generally outside the scope of flood management policies and plans.

The second, policy-based approach is structured around the following principles (WMO, 2009):

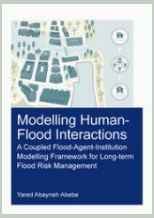
- adaptation to short-term climate change is a starting point for reducing long-term vulnerability to global warming;
- adaptation policies and measures are best evaluated in a development context;
- the adaptation strategy and the process through which it is implemented are equally important.

This approach focuses on long-term development at the national and regional scale, focusing on economic and financial planning, education, health, agriculture, food and environmental security, which are the basis for targeted action at the local (urban) level through the involvement of social groups, civil society, organisations and individuals.

The adaptive approach focuses on the overall capacity of communities to adapt to and be resilient to extreme and sudden weather events and longer-term adverse trends. This capacity is highly dependent on improving and sharing knowledge about climate change, its effects and the adaptation of human settlements to such phenomena, creating better forecasting and early warning capabilities, and generally improving the socio-economic level of the population.

Over the last decade, several cities around the world have been working to implement plans to integrate knowledge, technological and engineering innovations, economic and financial strategies to make their urban contexts more resilient, with the aim of mitigating the phenomena related to global warming, but above all to adapt their built and unbuilt spaces to its irreversible and inevitable impacts.

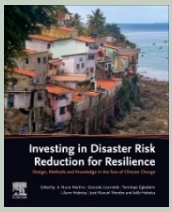
Modelling Human-Flood Interactions



Authors/Editors: Yared Abayneh Abebe
Publisher: Routledge
Publication year: 2021
ISBN code: 9780367748869

The negative impacts of floods are attributed to the extent and magnitude of a flood hazard, and the vulnerability and exposure of natural and human elements. In flood risk management (FRM) studies, it is crucial to model the interaction between human and flood subsystems across multiple spatial, temporal and organizational scales. Models should address the heterogeneity that exists within the human subsystem, and incorporate institutions that shape the behaviour of individuals. Hence, the main objectives of the dissertation are to develop a modelling framework and a methodology to build holistic models for FRM, and to assess how coupled human-flood interaction models support FRM policy analysis and decision-making.
To achieve the objectives, the study introduces the Coupled fLood-Agent-Institution Modelling framework (CLAIM). CLAIM integrates actors, institutions, the urban environment, hydrologic and hydrodynamic processes and external factors, which affect FRM activities. The framework draws on the complex system perspective and conceptualizes the interaction of floods, humans and their environment as drivers of flood hazard, vulnerability and exposure. The human and flood subsystems are modelled using agent-based models and hydrodynamic models, respectively. The two models are dynamically coupled to understand human-flood interactions and to investigate the effect of institutions on FRM policy analysis.

Investing in Disaster Risk Reduction for Resilience



Authors/Editors: A. Nuno Martins, Gonzalo Lizarralde, Temitope Egbelakin, Liliane Hobeica, Jose Mendes, Adib Hobeica
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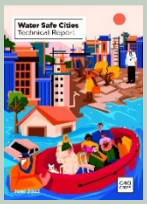
Publication year: 2022
ISBN code: 9780128186398

Disaster prevention and the mitigation of climate change effects call for global action. Joint efforts are required among countries, economic sectors, and public and private stakeholders. Not surprisingly, international organizations, such as the United Nations agencies, propose policy frameworks aimed at worldwide influence. The 2015–2030 Sendai Framework seeks to create consensus about the need to act for disaster risk reduction and climate adaptation. A key goal is to promote investments in risk reduction and resilience. But how useful is this policy framework? What does it say, and what does it overlook? How can it be implemented among vulnerable communities, in historic sites, and in other sensitive locations affected by disasters?
In this book, prominent scholars and practitioners examine the successes and failures of the Sendai Framework. Their case studies show that, despite its good intentions, the Framework achieves very little. The main reason is that, while avoiding a political engagement, it fails to deal with disasters' root causes and guide the difficult path of effective implementation.The authors bring a fresh look to international policy and design practices, highlighting cross-disciplinary research avenues, and ideas and methods for low-income communities, cities and heritage sites in Portugal, Haiti, the United States, the Philippines, New Zealand, Sri Lanka, Nigeria, among other countries.Global action requires collaboration between heterogeneous stakeholders, but also the recognition of inequalities, power imbalances, and social and environmental injustices.

Water Safe City



Editors-in-Chief: C40
Publisher: C40 Knowledge Hub
Publication year: 2022
Website: https://www.c40knowledgehub.org/s/article/Water-Safe-Cities?language=en_US

This report from C40's Water Safe Cities programme shines a light on the likely impact of flooding and drought by 2050, focusing on the 97 cities in C40's membership. The research finds that, without urgent action, millions more people face grave risks from frequent and severe flooding and drought, as well as significant economic, health and social impacts. If global warming continues unabated, 7.4 million people in C40 member cities alone will be exposed to severe river flooding within the next three decades, with damages expected to cost $64 billion per year by 2050 – even with current levels of global flood protections in place. The results are indicative of likely climate change impacts for countless more cities around the globe.

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