

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 CITY CHALLENGES AND EXTERNAL AGENTS.
METHODS, TOOLS AND BEST PRACTICES

TeMA

Journal of
Land Use, Mobility and Environment

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The cover image shows redeveloped building in the Garibaldi neighbourhood in the city of Milano (Picture by Fastweb, retrieved from: <https://www.facebook.com/Fastweb/photos/10158794132149472>).

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REVIEW NOTES – Urban planning literature review

Climate adaptation in the Mediterranean: Where are we?

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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 first contribution aims to outline the scenario of climate risks faced by cities on the Mediterranean coasts. The *mare nostrum* region is particularly sensitive to global warming-related phenomena, both because of its position exposed to oceanic, Saharan and polar currents, and because of its intrinsic vulnerability, the roots of which are to be found in the history of conflicts and migrations, of development visions that are antithetic yet complementary. The first 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.

Keywords

Ecological Transition; Urban planning; Strategies.

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1. Introduction

The word climate derives from the Greek word *klima*, meaning "trend", and does not refer to weather forecasts but to the average state of the sea-land-atmosphere system over a relatively long period (at least thirty years). During the first Earth Summit in Rio de Janeiro in 1992, celebrating the birth of the United Nations Framework Convention on Climate Change (UNFCCC), climate change was recognised as "directly or indirectly caused by human activity [...] altering the composition of the Earth's atmosphere" and is in addition to normal "climate variability" (UNFCCC, 1992). Although this well-known and established definition makes a distinction between "climate change" attributed to human activities and "climate variability" addressable to natural causes, many researchers agree that human activity is a dominant cause of the phenomena observed since the middle of the last century and closely related to global warming.

The trigger is scientifically and culturally recognised. The increase of gases (commonly known as greenhouse gases – GHG) in the atmosphere, such as carbon dioxide (CO₂) and methane (CH₄), causes more solar energy to be retained in the seas, landmasses and atmosphere, changing the flow of heat energy in the earth's climate system. It is interesting, as well as profoundly dramatic, to study how human activity from the second industrial revolution to the present day (quantified in terms of climate-changing gas emissions into the atmosphere) has contributed to triggering irreversible phenomena and how political strategies on a global scale have tried (and in some cases succeeded) in limiting damage and danger to the world's population.

As indicated in a recent report by the Intergovernmental Panel on Climate Change (2014), the total GHG emissions due to human activity increased from 1970 to 2010, with a larger absolute increase for the last decade (Budescu et al., 2014). It is worth noting that about half of the equivalent carbon dioxide released into the atmosphere between 1750 and 2010 was produced alone in the last 40 years. This issue highlights how human activity has contributed to the intensification of climate change.

What emerges from these data is that economic and population growth are the main drivers of increases in GHG emissions. Researchers affirm that the contribution of population growth in the first decade of the 21st century has remained roughly the same as in the previous three decades, while the underlying contribution of economic growth has increased significantly. In this respect, the increase in GHG emissions in the first ten years of the century is most likely linked to the production activities of China and other emerging economies. As a result, atmospheric concentrations of GHGs have increased significantly, extending and intensifying the natural greenhouse phenomenon, with proven negative influences on life on planet earth.

According to these data, and without implementing new and innovative actions and strategies, climate-changing gas emissions are expected to grow, driven by unstoppable economic activities. Scientists and researchers predict that the average temperature of the earth's surface could increase by 3.7°C to 4.8°C by 2100, compared to the temperature in the pre-industrial period. These climate changes are followed by widespread consequences and effects on the entire earth's surface: rising sea levels, burning forests, melting glaciers, violent hurricanes, tropical storms, droughts, heatwaves, and an increase in hot days.

We are already paying the price for these events, but the greatest burden falls on the population's poorest and most vulnerable groups. Moreover, the problems caused by climate change are accelerating at a rate that is difficult to estimate, and technicians and policymakers do not have a suitable ledger to measure them as well as cope with them. Although we are now aware of climate change, the most significant political, ecological, social and economic consequences have yet to happen. Analysing and anticipating these consequences is a huge challenge because planetary politics is extremely complex, as climate science and the history of the last forty years demonstrates this.

The consequences of these phenomena on physical and natural environments, as well as on urban environments, in the coming decades are difficult to predict because how the climate will change and how much society will be able to absorb its impacts are highly controversial issues, despite the efforts of technological development and scientific research. For example, different groups of experts often reach

different conclusions when defining the risks due to climate change. Some experts believe that the consequences of climate variability over the next few decades will be small, as they predict a combination of stabilising effects, reduced sensitivity of physical systems, biological resources, policy responses to climate change, and good community responsiveness to the economic and social impacts of phenomena related to climate and weather variability. This latter quality depends partly on the considerable scientific and technological capabilities of international communities.

Other experts see climate change as much riskier because of the speed at which the phenomenon is advancing and will lead us to climatic conditions never before experienced in human history. Moreover, the planet's physical characteristics, the biological resources on which society depends, and the social systems are highly adapted to the existing conditions since they have been stable for thousands of years. This instability increases the disturbance potential of climate change. Moreover, the succession of events has shown that even slight changes can have significant consequences for local and/or regional societies, leading to the increasingly frequent occurrence of real natural disasters (Disse, 2020).

Even in the absence of the profound uncertainty about the consequences of climate change, as evidenced by the divergences between experts on the subject, the phenomenon still represents a complex challenge in managing its risks. Policy responses necessarily complement objective information on the relationship between the sea-land-atmosphere system and the societies in which we live with subjective judgements that have to do with the heterogeneous awareness of the phenomenon, the equity between nations and peoples and the consideration we give to cultural heritage and/or non-human species. All this contributes to the complexity and often controversy of managing the risks associated with climate and meteorological variability on the planet (Busch, 2019; Chen et al., 2020; Glasser, 2020; Sillmann, 2021).

Policies adopted to limit climate change fall into two broad, non-mutually exclusive categories of action:

- Mitigation, to reduce the emissions of climate-altering gases and prevent potential increases in near future (Mi et al., 2019; Ivanova et al., 2020);
- Adaptation, to increase society's capacity to respond to climate change, also with the support of geoengineering or climate engineering (Lin, 2020), for the management of territorial systems, at different scales, in order to limit the impacts of the high concentration of GHG in the atmosphere (Aguilar et al., 2018).

In many cases, the boundaries between one type of action and another are blurred: actions aimed at reducing emissions may increase the adaptive capacity of territorial systems and vice versa. Possible strategies to manage natural, social and economic risks related to climate change are strongly contaminated by each other: decision-makers can simultaneously work on integrating practices and/or policies aimed at mitigating GHG emissions and adapting territorial systems according to the dictates of geoengineering. However, as the political dynamics of the past decades show, many efforts have been made to implement mitigation actions aimed at limiting and reducing GHG concentrations in the atmosphere, but adaptation actions are gaining more and more space in the international political and scientific landscape.

The adaptive capacity of a social and economic system, such as a city, depends on its response to climate change to limit damage and potentially benefit from it. Climate adaptation actions include changes in community behaviour, resource use and technology. In addition, working on climate change adaptation seems to be a critical path since some consequences seem to be irreversible, even if this strategy involves much more cognitive and decision-making efforts to design suitable tools to adapt the cities to phenomena of different magnitude and nature.

Given these preliminary considerations, the next paragraph focuses on the climate conditions of Mediterranean cities. The main hazards facing the coastal areas of the basin are outlined. In addition, the characteristics that contribute to the increased vulnerability of the area to climate change-related phenomena are presented.

The aim of this first contribution to TeMA Vo. 15 is to present interesting scientific literature in the field to define state of the art, the exposure to the impacts of global warming and the vulnerabilities of the Mediterranean territory in order to explore opportunities for growth and development in response to the climate crisis, which will be further analysed in next contributions.

2. The risks of a changing climate for Mediterranean coastal cities

The Mediterranean basin is one of the most sensitive regions to global warming. It has been defined a "Hot-spot" (Giorgi, 2006), based on the results of global climate change projection scenarios. The latest report of the International Panel on Climate Change (IPCC, 2018) highlights that the Mediterranean area is among the most vulnerable in the world, with respect to the impacts of climatic and meteorological phenomena. The global panorama underlines the need to estimate the possible consequences for this region, which will be increasingly hot and dry. During the 20th century, the air temperature in the basin was observed to have increased significantly, by 1.5°-4°C, depending on the area (Meyssignac et al., 2011).

Over the same period, and with a clear acceleration since 1970, temperatures in south-western Europe (Iberian Peninsula, southern France) have increased by around 2°C. The same phenomenon has been recorded in North Africa, although it is more difficult to quantify given the discontinuity of the natural and man-made environments in the area. A key element for the climate of the Mediterranean region is the presence of the sea, which represents an important energy and moisture resource for the atmosphere, although the recorded anomalies of the Sea Surface Temperature (SST) govern, at least partially, the air temperature and precipitation phenomena for the surrounding areas (Balaban & Şenol Balaban, 2015; Satta et al., 2017; Pérez-Andreu et al., 2018). The region is located in what is defined as a transition zone between the subtropical and mid-latitude weather and climate regime. The territories bordering the Basin are characterised by a complex and heterogeneous orography, as well as dense and extensive population centres.

The Mediterranean is a shallow sea, so its waters warm at higher rates than those of the oceans (WWF, 2019): in recent years, in fact, the temperature of surface waters has increased by as much as 1.4°C (as of 2018), compared to the temperatures recorded at the end of the last century, reaching as high as 30°C in summer, while that of deep waters by 0.2°C.

Among the consequences of overheating in the entire Mediterranean region, much more frequent and intense heat waves have been recorded, as well as longer periods of drought. Another effect, not negligible for coastal cities and the region's blue economy, is the significant rise in sea level. In the last two decades, a rise of 3 cm has been recorded every ten years. This is not an outlier compared to the global trend, and climate experts say that it is mainly due to the North Atlantic Oscillation (NAO), i.e. the atmospheric variability between the Andorra and Iceland, which is responsible for climate phenomena over a large area of the northern hemisphere. However, this is a significant increase, compared to the increases in the periods 1945-2000 and 1970-2006, when increases of 0.7 mm and 1.1 mm per year, respectively, were recorded.

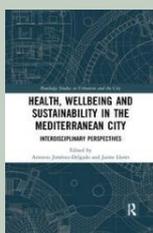
In addition, the Mediterranean Sea will suffer, due to an increased concentration of CO₂ in the atmosphere, from significant acidification: the pH of the waters is predicted to decrease from 0.018 to 0.028 units every ten years (Giorgi & Lionello, 2008; Lionello & Scarascia, 2018; Brownlee et al, 2021). Even if we succeed in limiting the rise in temperature to below 2°C, as established by the Paris Agreement, the Mediterranean region will still feel the dramatic effects of this phenomenon. Researchers and scientists predict that these changes will result in more frequent heat waves, as well as more frequent hot days, characterised by temperatures above the seasonal average (Gaaloul, 2020; Diodato et al., 2020; Ogaya & Peñuelas, 2021).

In particular, return periods of heat waves in the eastern Mediterranean region could decrease from two years to less than one year. In addition, a reduction in rainfall of about 10-15% is expected for southern France, northwestern Spain and the Balkans, and up to 30% for Turkey and Portugal. The scenarios are considerably more dramatic if the temperature increase were to be between 2°C and 4°C: by 2080, the whole of southern

Europe will suffer from widespread decreases in precipitation, up to 30% (especially in spring and summer months), and even ice absence over the Balkans (Grillakis et al., 2020; Soto-Navarro et al., 2020). The global temperature increase of 1°C is estimated to result in a decrease of about 4% in rainfall for much of the Mediterranean region, especially in the south. At the same time, precipitation is expected to increase considerably, by up to 10-20%, for all seasons except summer. Global trends estimated by the IPCC (Fifth Assessment Report - AR5) predict that sea level rise will be between 52 and 98 cm, compared to the current average level (IPCC, 2014; Robertson, 2021). In contrast, a semi-empirical model developed by Vermeer and Rahmstorf (2009) predicts a sea-level rise between 75 and 190 cm. Several models and scenarios have been developed for the waters of the entire planet, but the results can be very different, given the large number of variables involved and the complexity of their interrelationships. For the Mediterranean, the contributions of water transport across the Strait of Gibraltar, regional changes in river outflows, significant land movements in the eastern part of the basin, as well as the potential increase in salinity can all influence sea level rise, to varying degrees. Long-term predictions are therefore very imprecise and unreliable. In any case, even limiting global warming to below 2°C will result in significant differences in sea surface height, up to 10 cm: the coasts of southern Italy could be largely inundated by 2100; the coastlines of the Mediterranean Sea, more generally, could undergo substantial changes (Al Sayah et al., 2021).

The impacts on the infrastructures and economies of cities that have lived off the resources offered by the sea for centuries could be further compromised, if we consider that these changes will affect the territories of the basin together with other environmental phenomena, which are not negligible. It is necessary to consider that the population of Middle Eastern and North African nations quadrupled between 1960 and 2015. During the same period, the degree of urbanisation increased from 35% to 65% (Myers, 2021). The implementation of new irrigation techniques has allowed the intensification of agricultural activity, but the management of land use could change further, leading to consequences especially for water resources. In addition, air and water pollution, unless local improvements in wastewater treatment are made, have increased as a result of increasing urbanisation, private transport and other factors. Political conflicts also have inevitable and dramatic impacts on the environment, as do continuing migration flows, which plague already poor economies and deplete their ability to adapt to climate change. The combination of natural and anthropogenic hazards, identified in this paragraph, represents the main challenge for urban systems living on the Mediterranean Sea for the coming decades. Some research, including that of Guiot et al. (2018), states that the impacts of climate change on the Mediterranean basin are not only accentuated, compared to global trends, as shown above, but have been strongly underestimated. Each individual problem has indeed been examined independently, but the truth is that they are closely interconnected and, above all, interact with social and economic problems that further amplify their impact.

Health, Wellbeing and Sustainability in the Mediterranean City. Interdisciplinary Perspectives



Authors/Editors: Antonio Jiménez-Delgado, Jaime Lloret
 Publisher: Routledge
 Publication year: 2019
 ISBN code: 978-0-42940-157-2

This book provides a model for the creation of sustainable and healthy cities in the Mediterranean region. It uses the coastal city of L'Alfàs del Pi in Spain as an example for designing renewable and innovative urban models that offer high standards of living, wellbeing and eco-friendly advantages. Quantitative and qualitative analyses are presented by scholars in a wide variety of fields to provide a thorough understanding of the social, cultural, economic, political, physical, environmental and public health influences, through the case study of L'Alfàs del Pi. L'Alfàs del Pi has a geographically unique population made of a mixture of local inhabitants and Northern European residents attracted by the weather

conditions and the sea. The chapters in this book explore a series of innovative proposals for addressing concerns in the area, including historic preservation, sustainable transportation, promoting health and physical activity and water conservation. The methodology establishes a strategic approach that serves as a useful reference point for coastal cities, particularly in Mediterranean countries, in the creation of sustainable and healthy cities.

The book addresses the topic of Mediterranean climate adaptation through the lens of different perspectives which range from urban planning to tourism, from health geography to architecture. Moreover, it tries to give an interesting and holistic gateway to the Mediterranean city.

Climate Change in the Mediterranean and Middle Eastern Region



Authors/Editors: Walter Leal Filho and Evangelos Manolas

Publisher: Springer

Publication year: 2022

ISBN code: 978-3-030-78565-9

Climate change is having a much greater impact in the Mediterranean than the global average. In the Paris Climate Agreement, the UN member states pledged to stop global warming at well below two degrees, if possible, at 1.5 degrees. This mark, which is expected elsewhere only for 2030 to 2050, has already been reached in the region. The situation could worsen in the coming years if the global community does not limit its emissions. The above state of affairs illustrates the need for a better and more holistic understanding of how climate change affects countries in the Mediterranean region on the one hand, but also on the many problems it faces on the other, which prevent adaptation efforts. There is also a perceived need to showcase successful examples of how to duly address and manage the many social, economic and political problems posed by climate change in the region, in order to replicate and even upscale the successful approaches used. It is against this background that the book *Climate Change in the Mediterranean and Middle Eastern Region* has been produced. It contains papers prepared by scholars, practitioners and members of governmental agencies, undertaking research and/or executing climate change projects, and working across the region. It serves the purpose of showcasing some of the works in respect of applied research, field projects and best practice to foster climate change adaptation across the region. This book is structured in two main parts. The first one is dedicated to climate change models and impacts; the second concerns climate change adaptation and resilience initiatives.

Mediterranean Economies 2020



Editor: Salvatore Capasso and Giovanni Canitano

Publisher: Il Mulino

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The annual report published by ISMed-CNR (Mediterranean Studies Institute) focuses on mobility as a source of prosperity for all Mediterranean countries. Mobility is the deep soul of the market and is the engine that enables any economic system to grow and prosper. Driven by endogenous forces, when free to move, factors of production flow towards higher-yielding investments with the result of stimulating productivity and growth. Moreover, the greater the output gaps, the greater their impact in terms of productivity.

The report recognises that the Mediterranean region is an area of great inequalities and economic and demographic differences, not only between the north and south shores, but also within countries and between regions. Here, more than elsewhere, the lack of mobility factors compromises the growth and development of the entire area.

Mediterranean Economies 2020 is a collection of essays analysing the nature and effects of mobility factors in the Mediterranean. In particular, the collection focuses on the socio-economic impact of human capital mobility in the labour market and on the specific characteristics of migration in the Mediterranean. In addition, the book also offers new analyses on some important aspects of goods mobility: the relevance of logistics and port infrastructures in the Mediterranean and the dynamics of traffic in the basin in recent years.

The Report on *Mediterranean Economies 2020* is the follow-up to the long-standing Report on *Mediterranean Economies*, and as such intends to provide an annual overview of the political and economic conditions in the area. This year, while focusing on mobility, this collection of studies also offers an account of the impact of the coronavirus pandemic on the basin's economies and outlines possible recovery scenarios.

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