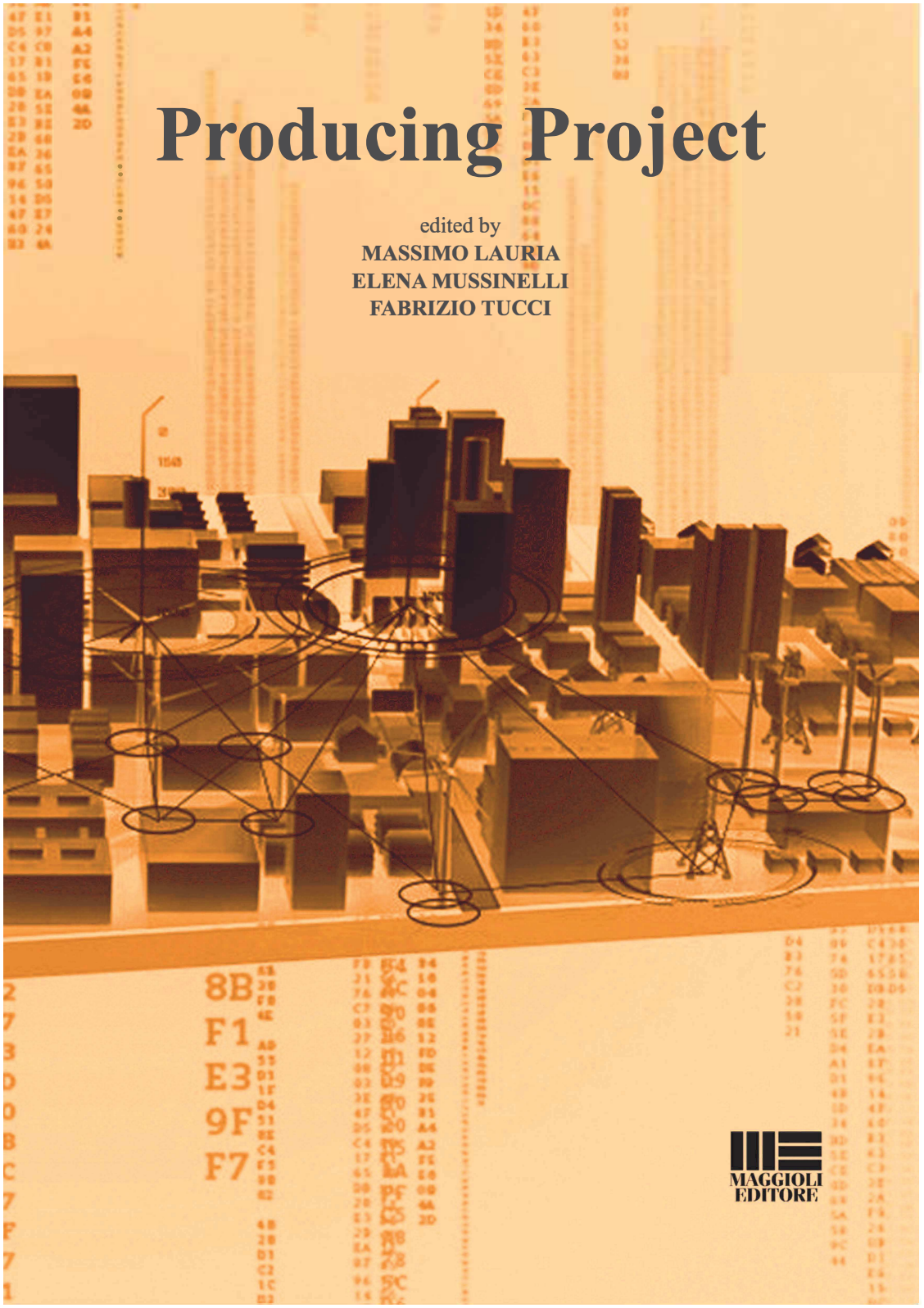


Producing Project

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The transformations created about the design activity by the several challenges started by the economic crisis, climate change and environmental emergencies, together with the impact of the Web and ICT on social and productive systems, highlight many critical issues, but also significant prospects for updating concerning places, forms, contents and operating methods of “making architecture”, at all levels and scales.

In this context, the cultural tradition and disciplinary identity of Architectural Technology provide visions and effective operating practices characterized by new ways of managing and controlling the process with the definition of roles, skills and contents related to the production chains of the circular economy/green and to real and virtual performance simulations.

The volume collects the results of the remarks and research and experimentation work of members of SITdA - Italian Society of Architectural Technology, outlining scenarios of change useful for orienting the future of research concerning the raising of the quality of the project and of the construction.

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3.24 PRINCIPLES OF THE GREEN ECONOMY AND DESIGN STRATEGIES FOR CLIMATE ADAPTATION

*Marina Block**

Abstract

The central role of adaptive design, in designing inclusive and resilient spaces, leads to investigate habitat modification processes in local contexts that, based on climate projections, prefigure actions of evaluation, verification and updating of data and influence the variables that affect the perception of comfort in urban space. The contribution suggests a possible Climate design strategy for the urban environment that, drawing on the principles of the Green Economy and simulating possible scenarios, provides tools and technical solutions of different nature aimed at responding to the alterations of urban space.

Keywords: Climate change, Adaptive design, Green economy, Local project, Urban district

Introduction

In response to the important environmental and climatic challenges to which our society is called upon to provide appropriate answers, the formulation of an operative methodology applied to the issue of the regeneration of peripheral and marginal urban districts through climate adaptive design approaches, aimed at adaptation and mitigation of the effects of climate change on the built environment and the improvement of environmental quality, is tactical.

The adaptive design approach in the implementation of regeneration programmes based on adaptation principles as a response to environmental and socio-economic challenges is in line with the EU development guidelines: from the objectives of Cities of Tomorrow to those of 2030 Climate and Energy Policy Framework, to the 2050 Roadmap initiative promoted by the European Climate Foundation, through the establishment of networks that relate resources, built environment and actors involved in the process and that are able to manage an increasingly complex system.

The modification of the local contexts' habitat requires to influence the variables that act on the well being of the urban space, defining adaptive responses

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to face the environmental impacts and prefiguring actions of evaluation, verification and updating of data and climate projections, in order to design inclusive and highly resilient spaces. The aims suggested by the Manifesto of the Green Economy (2017) underline the urgency of developing specific studies in different local contexts, to define regeneration strategies appropriate to the different climatic-environmental, settlement and socioeconomic features, as well as suitable tools for the control and measurement of the performances offered by the adaptation solutions. In collecting the inheritance from the normative and performance-oriented normative culture, the discipline of environmental design is measured with a «less deterministic dimension and more adherent to the complexity that characterizes the quality of living» (Lauria, 2014), and fosters the conscious and measurable introduction in the urban project for environmental input, explaining the differences on the local level, without losing sight of the systems' complexity, operating in an integrated way and also measuring objectives, constraints and resources, which the specific environmental contexts impose (Dierna, 1995). Within the Community and national legislative framework and in reference to complex decision-making processes, this integrated and systemic approach interacts with the emerging scenarios of digitization of the construction sector, which contribute to define for the urban project - in an environmental key - and for the building process, greater efficiency rationales, in which aspects of simulation, technical and performance control of environmental impacts emerge. Drawing on environmental, demographic and sociocultural data, adaptive design can identify, starting from the simulation of possible scenarios in a predictive and proactive project perspective, the most critical aspects and factors that affect the urban space and the effects that these have on people and their behaviour, providing tools and technical solutions aimed at responding to such unavoidable alterations. Through an appropriate culture of the environmental design addressed to the mitigation and adaptation in a climate change regime, also through attentive listening to social demand, technologically appropriate actions are proposed in which innovation becomes a strategic perspective and systematic tension of project action (Schiaffonati et al., 2011).

Innovative approaches for the urban project

The description of a methodology for adaptive design to support a sustainable urban project is developed through a multiscale approach that takes into account the different levels of planning - territorial, metropolitan, municipal, local - in light of the climate emergency and the aims set from the National Plan of Adaptation to Climate Change and from the strategic ones suggested by the Manifesto of the Green Economy.

The contribution of environmental design to local adaptation plans, as foreseen by the National Plan for Adaptation to Climate Change (2017), can take

place at various scales and in different ways. An effective contribution can be found at the metadesign level using tools for the knowledge and transformation of the built environment, in the awareness of the phenomena affecting the urban system, intercepting socioeconomic and cultural transformations, the innovations of the regulatory framework and public policies on the environment, energy, planning (Mussinelli, 2015).

Overcoming urban studies of a mainly type-morphological nature, this approach develops on several dimensions - from the consideration of the specificity of contexts to the rational management of resources - and in a multidisciplinary approach useful for preserving the spatial dimension of design strategies, making use of innovation technology to identify positive effects on the quality of life and, therefore, on social processes.

The current European research guidelines identify in cities the contexts where the negative effects related to the climate change phenomenon will be most evident. The tendential worsening of climatic conditions and the increase in extreme weather events (rising temperatures, droughts, heat waves, more intense rainfall, rising sea levels), will hit more consistently those contexts, typical of the contemporary city, in which the conditions of liveability, endowment of services, identity, environmental performance and resources consumption, are already strongly disadvantageous.

Cities, and in particular peripheral and marginal areas, therefore require an urban project declined in terms of mitigation and adaptation, considering that

«less efficient mitigation measures will require more significant adaptation actions: the mitigation and adaptation policies must be dealt with in concert, exploiting all possible synergies» (Mezzi, Pellizzaro, 2016).

Adapting the city to climate change also means acting, through the architectural design, exploiting the opportunities offered by the values of the contexts in which it operates considering «the territory a heritage from which to draw to produce wealth, continuing, through the production of new territorial acts, to guarantee their existence and to increase their value» (Magnaghi, 2010). The guidelines of the European Strategy for Adaptation to Climate Change COM (2013) 216, implemented in Italy by the MATTM in 2013, underline the urgency of developing specific studies in different local contexts, to define regeneration strategies appropriate to the different climatic, environmental, settlement and socioeconomic features, as well as suitable tools for the control of the performances of the adaptation solutions. In order to offer a further boost to the limited initiative that has taken place in Italy in response to the risks associated with Climate Change - only a few municipalities have in fact adopted an Adaptation Plan - in 2016 the 5th edition of the General States of the Green Economy dedicated a working table to development of a manifesto for architecture and urban planning, providing proposals and claims aimed at encouraging mitigation and adaptation policies in response to the climate challenge.

The focal points of the proposal are aimed at promoting green infrastructure and safeguarding water resources for the protection of natural capital and eco-

system services, encouraging circular models of economy and more sustainable mobility, and regenerating urban interventions that look above all to the redevelopment of the vast public heritage, in a conscious project of ecological conversion and exaltation of the quality of the cities, so that these can turn out to be more liveable and inclusive (Antonini, Tucci, 2017).

More recently, in the National Plan for Adaptation to Climate Change (2017), the socioeconomic and natural sectors were identified, within which to implement key actions on adaptation, alongside the top down approach of a large area, operations bottom up, to the urban district or neighbourhood scale, for a more detailed knowledge of the contexts on which we are going to act and a more accurate prediction about the measures to be implemented.

Environmental planning, intended as a redefinition of man's habitat, allows on the one hand to analyse the variables that act by altering the perception of well being in the urban space for defining adaptive responses to cope with the stresses of the external environment, on the other to update values of the past by integrating them in the present as resources and, therefore, «as goods that are a cultural reference of a new settlement project, contrasting both the degradation and the embalming of the environment» (Vittoria, 1985).

Climate design for the urban environment: a possible design strategy

A sustainable approach to the urban project looks at the urban district scale in the local project as the optimal dimension for the development of urban and environmental cycles, and attempts to define nature-based solutions for adaptive design interventions.

The local project themes, linked to the increase in the value of the territorial heritage for future generations and to the idea of bio-region as an institution of virtuous relationships between different focuses, identified within the entire territorial heritage, could allow the identification of the useful dimension to promote self-revaluation of identities in order to reduce the vulnerability to changes. The definition of the boundaries within which optimizing the cycle of urban metabolism and generating a multiplication of urban centralities, allows to favour the enhancement of historical identities and appropriate degrees of functional and productive complexity (Magnaghi, 2010).

This approach has already been widely accepted in international good practices, such as the adaptation plans of Hamburg, Rotterdam and Copenhagen, where environmental design emerges as a key factor in reducing vulnerability and enhancing the built environment, acting on the definition of the conforming dimension of the urban district in which implementing actions of mitigation and adaptation to Climate Change.

The further identification of homogeneous urban areas, an intermediate dimension between the urban district and urban elements, gives the possibility of considering potentially replicable interventions in areas with similar features.

The downscaling action allows a broadening of knowledge starting from the observation that the vulnerability of urban systems is influenced by the impact of climate change on the local scale on urban and natural elements, on people and economic, social and cultural resources.

The functional-spatial, technological and environmental performances, as well as the characteristics of the road layouts, of the orientation, of the morphological-type components, of the construction techniques, of the orographic conditions, of the green areas, strongly influence the system's vulnerability and require to be known and managed for foreseeing effective adaptation interventions¹. Implementing strategies and adaptation interventions starting from the urban districts requires their coherent perimetrations, taking into account natural and anthropic limits, as well as parameters relating to the homogeneity of the built up fabrics, the number of inhabitants, the covered area and the population density.

A district can in turn be divided into homogeneous urban areas, having similar features and bounded by criteria and connotative elements, such as natural and anthropic limits (landscape elements, infrastructures, main viability); density of the built (main viability, coverage ratio); prevailing functions (use of the buildings); building type (period of construction); relationship between open and built spaces (use of open spaces)². Through environmental simulation software, it is possible to investigate the types of HUAs identified with respect to their climate profile and to a series of connotating indicators³, revealing the presence of climatic vulnerabilities, which cause a depletion of natural capital, a weakening of the social capital, the erosion of the cultural capital and of the identity of the places and the general worsening of the energetic and environmental question.

¹ This approach comes from studies and researches addressed in a wide way within the METROPOLIS – “Integrated and sustainable methodologies and technologies for the adaptation and security of urban systems” project, scientific coordinator: prof. Valeria D’Ambrosio, DiARC, University of Naples Federico II.

² A more detailed level of detail in the definition of the conforming dimensions of urban districts and homogeneous urban areas was dealt within the PRIN 2015 – “Adaptive design and technological innovation for the resilient regeneration of urban districts in climate change regime” research, scientific coordinator: prof. Mario Losasso, DiARC, University of Naples Federico II.

³ Specifically, with reference to the results of the Degree Thesis in Urban and Environmental Planning, entitled “Principles of the Green Economy and Strategies for Local Adaptation Plans”, by dr. Dario Colarusso, supervisor prof. Mario Losasso, tutor arch. Marina Block, have been investigated, through the ENVIMET software, the air temperature that affects the livability of open spaces; the surfaces albedo which, by retaining heat, cause the phenomenon of nocturnal reirradiation; the permeability of soils which, where absent, favors the increase in temperature; finally, a summary indicator, perceived thermal comfort (or PMV value).

This enables to define aims and strategic guidelines to prevent such phenomena and to identify a set of categories of mitigation and adaptation works which could be used within the field of the study and potentially replicable in the areas of the same type. Therefore, in relation to the aims of protecting natural capital, enhancing the heritage of cultural identities of places, mitigating and adapting to the causes and effects of Climate Change, of effective use and saving resources, we can identify a series of solutions, of which some nature based aimed at replicating the functions performed by natural ecosystems, which refer to categories of works distinguished according to their cost⁴. Comparing the effects at 2030 of the application of two light strategies and choosing the one that guarantees the greatest improvement, it is possible to consider the possibility of associating it with further interventions, making a deep upgrade, ensuring a clear improvement of the environmental comfort.

Conclusions

The proposed design strategy is an example of the contribution of environmental design within a local adaptation plan, starting from the definition of a district wide profile and defining, through a downscaling process, a set of adaptation and mitigation strategies for the identified vulnerabilities, distinguished by the different categories of area through the aims set by the principles of the Green Economy. In this way, adaptive design allows to overcome sectoral design guidelines through a systemic approach that looks at human comfort, environmental health, as an ecological, social, economic and cultural system, and finally at the flows of reciprocal interrelation to different scales (Forlani et al., 2016). Thereby we can activate design processes in which the territory can again be considered a place full of history, signs, values to be transformed into resources for the production of lasting wealth and to be transmitted enriched to future generations (Magnaghi, 2010), in response to the climate crisis we are facing. The identification of a conforming dimension to implement the various metadesign strategies and the development of solutions that enhance the specificity of cultural and environmental heritage, are innovative elements to support action plans of municipal or more extensive dimension, whose successful outcome cannot be separated from a phase of monitoring and evaluation of the effectiveness of the implemented actions, useful for defining good practices that can be replicated in similar contexts.

⁴ With reference to the same study, interventions on surfaces have been indicated as light with particular attention to the impact of colour and shading on climate phenomena (trees, absorbing surfaces, cool floors and roofs, shielding elements), while greening for the redevelopment of public and collective spaces (rain gardens, green surfaces and roofs) have been defined as deep.

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