



**Politecnico
di Torino**

Honors Thesis

Master of Science in Sustainable Architecture

Abstract

**Climate change mitigation and adaption in Italy:
methodological approach, design strategies and indicators**

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July 2023

The climate crisis we are facing is generating increasingly severe extreme weather conditions and events, causing massive environmental, social and economic damage.

Urban areas due to their polarization and population concentration as stated in the report 'Una demografia che cambia' (Nazioni Unite, 2020), in addition to suffering the greatest effects, will be the place where victory or defeat to climate change will be decreed. They prove increasingly vulnerable to events such as floods, heat waves, high winds and landslides, which are exacerbated by the constant presence of air pollution, causing a cycle of causes and effects with increasingly disastrous implications.

Within the global context, Italy is one of the countries that despite suffering the greatest consequences of climate change is not yet provided with a National Climate Adaptation Plan as stated in the report 'Emergenza eventi climatici estremi' (Legambiente, 2022) Many cities on the Italian peninsula are currently unable to cope with these disastrous phenomena, registering a high number of losses in terms of economy, human lives, cultural heritage assets and buildings as reported by 'Focus su Le città e la sfida dei cambiamenti climatici' (ISPRA, 2014).

Based on these assumptions, this thesis is aimed at planners who will need to implement solutions at the urban scale in the coming years to limit the effects of exceptional weather events in Italian cities.

The goal is to provide an easily actionable methodological approach based on easy-to-read and replicable operational tools linked to verification indices called KPIs. This type of approach is evolving and undergoes continuous modification and monitoring; therefore, the first results of European projects that are making use of it are taken as reference, adapting them to the specific needs of the Italian territory.

The first phase involves consulting a guide to extreme climate events in Italy, so planners will be able to identify in which climatic region the area or city of reference is located, understanding which phenomena it is most subject to and thus being able to assess a priority of interventions to be implemented. Once the critical issues are identified in the second phase, a catalog of actions is provided, ranging from solutions at the urban scale to solutions at the architectural scale, divided by extreme climate event, so that, professionals can easily select the necessary interventions.

Then, in the third step, the set (or matrix) of key performance indicators (KPIs), necessary to make quantitative and predictive assessments of the performance of design actions distinguished between mitigation and adaptation, is illustrated. The purpose of the KPIs matrix is to provide support to designers in making the most effective choice of interventions to be implemented.

In order to validate the effectiveness of the proposed methodology, case studies of six Italian cities, belonging to different climatic regions, were analyzed. The results of applying the method are systematized into a performance matrix, based on the performance of the design actions taken. A hierarchization of the actions is then carried out according to their effectiveness and possible criticalities.



Figure 1 proposed methodological approach



Figure 2 abacus actions

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