

Strengthening the Resilience of Coastal Cities against Climate Change through Spatial Planning: Evidence from Greece

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Abstract

Coastal cities are complex and ever-changing social, spatial, economic, and environmental systems. The equilibrium in such systems is challenged, while resilience is described as their ability to transform and adapt to cope with the pressures and disturbances they receive. The importance of enhancing the resilience of coastal cities has been recognized to such an extent that it now seems to complement the “traditional” approach to sustainable development, giving it new features and priorities. The pressures on Greek coastal cities are further compounded by climate change, one of the top policy issues at the international and European Union (EU) levels. The EU attaches increased importance to formulating adaptation policies against climate change effects. This factor is the main reason for the recent institutionalization of a series of laws and plans in Greece to promote adaptation policies to the expected effects of climate change. However, at the national level, a framework for exercising adaptation policies to the expected effects of climate change has been introduced only in the last few years. This framework sets the rules for shaping future national and regional policies. The spatial planning of Greek coastal cities is recognized as one of the main challenges in adapting the resilience of Greek coastal cities to the expected effects of climate change. According to the National Adaptation Strategy, Greek coastal cities are expected to suffer significant pressure due to climate change. However, until today in Greece, despite its coastal character, the search for those policy directions and methodological planning tools for its coastal cities has not been studied sufficiently and in adequate depth. This paper introduces a methodological framework for integrating the principles, priorities, structures, and policies in spatial planning policies to ensure and strengthen the resilience of Greek coastal cities against climate change.

Keywords

Sustainable Development, Climate Change, Resilience, Greece, Coastal Cities, Spatial Planning

1. Coastal Cities, Resilience against the Impacts of Climate Change, and Spatial Planning

Coastal cities are complex and ever-changing social, spatial, economic, and environmental systems (Sanchez et al., 2018; Lee, 2015). The term equilibrium is challenged in these types of systems. Their resilience is related to their ability to transform and adapt to cope with the pressures and disturbances they receive (Carpenter et al., 2005). On the other hand, each city is a particular case.

A fundamental parameter to enhancing the resilience of a coastal city is its ability to reorganize, develop and innovate. Lechner (2015) pointed out that a vital characteristic of a resilient system is its ability to adapt dynamically to significant changes without ceasing to function, even if it functions differently in the future.

In this paper, the main characteristic of a “resilient coastal city” is defined as its ability to “absorb risks and recover from any pressures, maintaining its basic functions, structures and identity, its adaptability and its development potential despite constant changes” (Skintzis, 2016). The complex challenges coastal cities face require them to acquire scientifically based, long-term, and inclusive strategies to enhance their adaptive capacity.

Field et al. (2012) noted that a coastal city’s adaptive capacity and responsiveness level to potential impacts of climate change are defined by the institutional and human resources of the city. In a similar direction, Rosenzweig et al. (2014) recognized that the ability to adapt to climate change depends on issues such as institutional structure, the ability to analyze and process information, management, governance, and the flexibility of the actors involved to respond to the reality imposed by climate change.

Spatial planning is undoubtedly a central tool for enhancing the resilience of coastal cities. A more adaptive spatial planning, based on the needs of urban centers, is the most appropriate planning approach to enhance their urban resilience (Evans, 2011; Martin-Breen & Anderies, 2011; Beilin et al., 2015; Kafkalas et al., 2015; Collier et al., 2013).

Adaptive spatial planning treats spatial development plans as approaches to exploring alternatives and the effects of various policies on specific urban functions (Ahern, 2011). A central principle of adaptive spatial planning is multifunctionality, the basis of which is the mixing and switching of uses. This principle allows multiple and simultaneous reactions (response diversity) of the most vulnerable sectors (Angelidou, 2018).

Nowadays, the pressures on Greek coastal cities are further amplified by cli-

mate change, one of the top policy issues at international and European Union (EU) levels. The recent endorsement in Greece of laws and plans aiming to encourage adaptation to the expected impacts of climate change has been driven by the increasing importance the EU puts on formulating adaptation policies regarding the effects of climate change. This framework sets out the rules for formulating future national and regional policies.

According to the National Adaptation Strategy to climate change, coastal urban centers are expected to be under significant pressure due to climate change. However, in Greece, despite its coastal character, the pursuit of policy directions and methodological planning tools to make coastal urban centers resilient to the impacts of climate change has not been sufficiently studied until today (Lazoglou & Serranos, 2021).

A key consideration of this research was the suitability of spatial planning policies to ensure the resilience of Greek coastal cities against the impacts of climate change. Specifically, this research focused on highlighting 1) the principles, priorities, and tools of the Greek spatial planning system so that it can fully respond to the new challenges introduced by climate change, 2) the need to put resilience against the effects of climate change at the center of spatial planning policies in Greece, 3) the challenges spatial planning needs to meet to achieve the resilient development of Greek coastal cities, 4) the proper design of spatial planning guidelines to enhance the adaptive capacity of Greek coastal cities to the effects of climate change, 5) the need to use the capabilities modern technologies provide in investigating the above issues.

This paper introduces a methodological framework for integrating those principles, priorities, structures, and policies in spatial planning policies to ensure and strengthen the resilience of Greek coastal cities against climate change. This paper's fundamental consideration is that the convergence field between climate change and spatial policies is the integration of resilience initiatives into spatial planning policies.

2. Resilient City vs the Greek Resilient Coastal City: Climate Change Impacts and Challenges

The complex problems recorded in the Greek coastal cities are impossible to be solved following simple legislative regulations. On the contrary, integrated spatial planning approaches ensure the active participation of the local community, evaluation of all the physical, economic, cultural, and institutional parameters that prevail in the Greek coastal cities as well as the immediate mobilization of the agencies that participate in the planning and implementation of relevant policies. In addition, the approach to spatial planning policies to be followed must be characterized by flexibility and adaptability.

Critical requirements for a coastal city to be characterized as resilient against the effects of climate change are (Lazoglou, 2022):

- the existence of strong leadership with the simultaneous efficient and effec-

tive coordination of responsibilities and responsibilities regarding stress and disaster management;

- the broad and transparent participation of those involved, structures of communication, and mechanisms capable of facilitating effective risk management;
- the comprehensive and objective information of the city's agencies and citizens regarding the sectors in which the city is vulnerable to the effects of climate change;
- the regular risk assessments, prepared in the context of a long-term spatial planning agenda, aiming to strengthen the urban resilience of the coastal city;
- the formulation of a financial framework capable of promoting the implementation of actions to strengthen the urban resilience of the coastal city;
- the implementation of evidenced-based urban planning, carried out based on updated risk information and emphasizing the protection of the most vulnerable social groups, applying strict but realistic building rules that enhance the adaptive capacity of the coastal city;
- the expansion of knowledge and the strengthening of the action of entities related to urban resilience so that they are in a position to contribute substantially to the strengthening of urban resilience;
- the organization of actions to create a social consciousness that promotes the mutual support and cooperation of the city's inhabitants through education, social cohesion initiatives, and new technologies implementation;
- the preparation of a modern and constantly updated strategy, aiming to protect, maintain and anticipate the need to build a new critical infrastructure capable of ensuring the smooth operation of the coastal city's services and strengthening its resilience against the effects of climate change;
- the effective response to natural or artificial pressures through regularly updating relevant preparedness plans linked to early warning systems. In addition, actions are required to strengthen society's knowledge, abilities, and reactions to emergencies;
- the development of effective and immediate rehabilitation and reconstruction strategies so that they can shape a coastal city with enhanced adaptive capacity, especially after disasters and according to its long-term planning.

There is growing international concern about how to deal with the projected impacts of climate change on urban centers (Balk et al., 2009). Research efforts (e.g., Thoidou, 2017; Tyler & Moench, 2012) focus on recognizing the potential impacts of climate change and underline the need to formulate local policy measures for the projected impacts.

The trend of building (legal or illegal, within or out-of-the plan) exerts intense pressure on coastal cities and broadly on the Greek coastal area. It turns out that urbanization and the phenomenon of continuous "artificial" extension of their coastal front is a crucial challenge coastal cities have to manage. A thorough analysis of the relative legal provisions has been performed in a previous study

(Lazoglou & Angelides, 2016).

Another series of problems facing the Greek coastal cities relates to institutional issues. The responsibilities and competencies of entities for the management, protection, and development of the Greek coastal cities are exercised centrally, despite all the particularities they present. At the same time, the existence of co-responsibilities, the insufficient coordination, and the rigid horizontal processes recorded do not consider their unique characteristics (Asprogerakas et al., 2020). Moreover, significant time delays are recorded during the implementation of the policies that have been formulated.

At the local level, Greek coastal cities are dominated by different pathologies. Among the main ones are the lack of collective thinking and action, the hesitancy of local bodies and societies toward the decisions, actions, and policies of the central administration, and the limited know-how to deal with complex and diverse challenges.

The available resources are limited, with many economies of Mediterranean countries, like Greece, either being in a phase of transformation or experiencing the adverse effects of crisis phenomena (e.g., recent financial crisis, geopolitical pressures/migration flows, pandemics/Covid-19). These challenges intensify the needs and often exceed the capabilities of public bodies and states.

To date, a common approach to “healing wounds” in Greek-and other-coastal cities is the implementation of actions focused almost exclusively on urban regeneration policies, strategies, and tools. However, the rapid rate at which the social, economic, and environmental reality of Greek coastal cities is changing creates the need to constantly update urban regeneration tools to respond adequately, efficiently, and promptly to modern challenges.

Greek coastal cities experience a number of environmental issues (e.g., pollution, coastal erosion, fragmentation of agricultural land) that lead to the degradation and depletion of resources, such as deforestation and the loss of highly productive agricultural land (Lazoglou & Angelides, 2020). Among the most critical challenges that Greek coastal cities face today is the increase in their population, the changes in their coastal front, and the risks from the effects of climate change.

Some of the main climate change challenges facing coastal cities in Greece include (Lazoglou, 2022):

- the permanent flooding of coastal areas, resulting in the movement of coastal and beach zones, a phenomenon which could decisively change the physiognomy of coastal cities, their production base, their structure, and networks;
- the coastal erosion, which makes it difficult for habitats to survive, destroys economic activities, and is reinforced by the expected rise in sea levels;
- the increase in risks from extraordinary natural phenomena such as floods and storms;
- the worsening of their climatic conditions and the intensity of related phenomena (e.g., urban heat island);

- the reduction of agricultural production due to climate changes;
- the salinization of their underground coastal aquifers and the deterioration of the quality of their drinking water;
- the changes in their marine and coastal biodiversity, which affect the fishing sector;
- the movement of their populations due to the effects of climate change (climate refugees);
- the damage to their critical infrastructure (e.g., ports, road networks, sewage networks);
- severe changes in their economic activities, directly related to climatic conditions (e.g., tourism);
- the rapid changes in their land values;
- the increase in property insurance costs due to impending disasters;
- the increased cost of protecting and restoring their coasts.

In addition to the above, social exclusion phenomena are often recorded in Greek coastal cities due to the extraordinary degradation of coastal areas and excessive dependence/connection of their production base to specific economic activities (e.g., tourism). These problems are further enhanced by the incomplete or degraded urban infrastructure of coastal cities.

3. Formulation of a Methodological Framework to Strengthen the Resilience of Greek Coastal Urban Cities

To formulate a methodological framework (**Figure 1**) for shaping spatial planning policies able to strengthen the resilience of Greek coastal urban centers, the actions to be implemented need to be identified. The next stage is the prioritization of these actions based on the needs, priorities, preferences, and beliefs of the local community, combined with experts' opinions and the predictions of relevant studies. The third stage includes planning actions according to the particular characteristics of the examined area. The next stage focuses on implementing the proposed actions, based on the predetermined planning, with the maximum possible effectiveness and efficiency. The last stage is monitoring the implementation of the actions planned through a specially designed system of indicators. The pillars and steps of the proposed framework are based on the exploitation of the possibilities and advantages the use of modern technologies offers.

The proposed framework's objective is to create new capabilities and use existing skills and knowledge. The process and its components must be iterative, allowing time to build the understanding and relationships necessary for the venture's success.

The successful implementation of the proposed framework requires the creation of a working group to coordinate and evaluate the vulnerability points of the coastal city so that priority is given to those policies that strengthen urban resilience in specific issues. The working group members should be representative of the city's society. At the same time, it would be appropriate to include



Figure 1. Methodological framework for shaping spatial planning policies to strengthen the resilience of Greek coastal cities.

representatives of bodies directly related to climate change parameters, such as representatives from government departments, researchers from universities and research centers, members of civil society, representatives of productive branches and agencies, and representatives of disadvantaged social groups.

The successful implementation of the proposed approach also requires engagement with many stakeholders and citizens beyond those participating in the working group. Emphasis needs to be placed on social groups directly affected by climate change. It is noted, however, that the consistent participation of the working group members is equally critical. The city leadership's involvement from the beginning of the process and throughout the phases of the proposed framework improves the chances of integrating the results into institutionally pre-viewed decision-making and policy-making processes.

The proposed methodological steps will make it possible to:

- distinct roles and responsibilities between those involved in the formulation and implementation of spatial planning policies;
- deal with conflicting provisions and provisions of the existing spatial planning policy framework;
- redefine the values and priorities of spatial planning to solve existing problems with innovative approaches;
- include economic components in spatial planning policies at the national, regional, and local scale, with apparent references to the broader European context;

- shift spatial planning policies toward a more adaptive approach to reshape the goals and priorities based on the beliefs, expectations, and desires of the majority of the social groups of the coastal city;
- formulate spatial planning policies adapted to the special and unique characteristics of the coastal city, taking into account its disadvantages and advantages;
- prioritize spatial plans in a strictly structured way so that the best possible coordination of spatial planning policies is possible;
- integrate all social changes into the core of spatial planning policies;
- use spatial plans as tools and means of regulating and monitoring the evolution of land uses, especially on a local scale;
- promote spatial planning policies capable of redirecting the location policies of productive activities;
- the binding and essential monitoring of the achievement of the goals defined by the strategic planning and programming frameworks;
- coordinate the plans' provisions to address issues of conflicting categories of land use/productive activities location.

Resilience processes require a flexible schedule as they relate to challenging aspects to implement within inflexible time schedules. The planning of the relevant actions:

- utilizes new information and uses it to inform relevant policies;
- re-evaluates existing information, ideas, and beliefs;
- promotes trust and cooperation building between the involved bodies and society as a whole in the formulation of policies;
- faces unexpected challenges and delays;
- reassesses the future planning of the city.

Implementing the above methodological framework creates additional value in adapting Greek coastal cities to the climate change effects. Developing policy measures for specific coastal cities is the next step to using the proposed approach as a starting point. Moreover, it should not be forgotten that each study area has unique characteristics which require different evaluation.

The challenges coastal cities face are linked to their various activities. As a result, an integrated spatial planning approach is required to include management policies for their terrestrial, coastal, and marine parts. A dynamically changing and multifaceted response to climate change through specially designed strategies is regarded as a prerequisite to urban resilience.

The proposed spatial planning directions can strengthen the adaptive capacity of Greek coastal cities against climate change, promoting integrated policies to strengthen their resilience. Spatial planning policies based on modern technologies are within the core of this process. In a way, that promotes new ways of thinking and innovative solutions to create a dynamic, flexible, and adaptive approach to spatial planning, where the coastal city responds better to the needs, requirements, and preferences of those involved.



Figure 2. Building urban resilience of Greek coastal cities: Key parameters.

Building the resilience of a coastal city can be regarded as a four-step process (Figure 2). The first stage focuses on identifying parameters of exposure of coastal city systems to climate hazards. The next stage is to identify the coastal city's fragile systems and strengthen those characteristics that can reduce their vulnerability to climate risks. The third stage of the process focuses on strengthening the actors' capacities to enhance the city's adaptive capacity. The final stage of the proposed process promotes addressing the political and institutional parameters that limit the coastal city's vulnerability and adaptive capacity.

This approach aims to facilitate the guidance of users in identifying the parameters that cause the coastal city's vulnerability. The assessment is based on examining the level of vulnerability of four key parameters: infrastructure, natural ecosystems, society, and institutions (laws, policies, and social norms) of the coastal city.

Central pillars of the proposed spatial planning directions to strengthen the resilience of Greek coastal cities are:

- the preparation of a policy framework characterized by flexibility and adaptability. Emphasis is placed on defining the role of public administration and civil society;
- the successful practices examination of countries with spatial planning systems, similar to the Greek, to identify best practices and intelligent spatial

planning tools that can contribute to strengthening the resilience of Greek coastal cities;

- the formulation of policies that will substantially and effectively strengthen the resilience of Greek coastal cities in the context of a participatory process in which the effective utilization of available information plays an important role;
- the preparation of ad-hoc actions for vulnerable areas or areas with unique characteristics (cultural heritage, rare biodiversity) must be protected at all costs.

4. The Necessity of Integrating Resilience against the Impacts of Climate Change into the Spatial Planning System of Greece: Directions and Objectives

The future developments and challenges spatial planning policies will have to face are impossible to predict precisely. This is especially true concerning issues of resilience against climate change effects. The scientific community constantly struggles to acquire and manage new data, turn it into knowledge and make long-term assessments. However, this preparation is of great importance and necessity so that spatial planning policies in Greece acquire more competitive and attractive conditions. The pillars of this process are equality, justice, and social cohesion.

The effectiveness of applying specific development standards seems to be questioned (Gourgiotis & Tsilimigas, 2016) as they often fail to adapt to the new conditions created by the need for expanded and more substantial consultation processes. The ever-increasing importance of the role of local and regional governments limits the traditional role of the State and the ever-intensifying tendency for substantial and broad participatory processes. There is a need to reform the spatial planning system so that it can respond fully to the new challenges posed by climate change for coastal cities, placing their resilience against the effects of climate change at the center of the relevant policies.

The starting point for creating a spatial planning system could be the ongoing and constantly changing cutting-edge scientific dialogue regarding the interactions between compact cities and climate change. Spatial planning includes the social changes, particular characteristics of each region, preferences, beliefs, and expectations of citizens, and new development possibilities. The reformed spatial planning policies could prioritize the prevention and solution of accumulated problems as a top priority. New goals and ambitions for spatial planning need to be defined, and innovative policies for Greece's long-term development must be formulated.

Additional new perspectives that form 1) at the institutional and policy level, the European Green Deal, the European Climate Law, the 2030 Climate Target Plan, the New EU Strategy for Adaptation to Climate Change, and the European Climate Pact, 2) at the development level of the Recovery Plan for Europe, the

National Recovery and Resilience Plan, the Just Transition Fund as well as the financial instruments NextGenerationEU, REACT-EU and InvestEU are excellent opportunities for Greece to address and resolve long-existing problems and simultaneously form a modern development model.

The role of spatial planning is pivotal in achieving these goals. The transition toward a reformed spatial planning system is considered necessary. This reformed spatial planning system has to set the conditions and rules that may contribute to promoting a new pattern of development adapted to the new conditions created by climate change.

In this research, the proposed approach aims to integrate the Greek spatial planning system characteristics of natural planning with a normative character as proposed by many researchers (Giannakourou, 2008; Gourgiotis & Tsilimigas, 2016). An essential priority of the reformed spatial planning system is the effective resolution of conflicts between rules and unclear provisions, as these have emerged through applying the existing spatial planning framework. It is also crucial for the spatial planning system to define the framework for protecting the natural and man-made environment based on sustainability principles.

Another priority of a reformed spatial planning system could be the effective regulation of the limited harmonization that currently exists between the various levels of spatial planning. The purpose would be to ensure the resolution of problems arising from the delays in the review and updating processes of plans and programs. In this reformed spatial planning system, it would be necessary to clearly define the terms of harmonization among the different spatial planning levels. More effective prioritization of spatial plans and sectoral policies with spatial implications is also necessary, as, through them, it is possible to achieve control of land uses and the location of various economic activities.

A main priority of the reformed spatial planning system could be to solve the failure to connect development planning with spatial planning and the related sector policies (e.g., infrastructure policy, energy, and tourism). This effort is necessary to form tools and methods for linking spatial planning policies with other sectoral policies directly related to space (e.g., agricultural policy, transport policy).

It is also important to restore the feelings of legal certainty, transparency, equality, and equity to the citizens and various actors involved in spatial planning. This could be achieved through establishing transparent and participatory procedures. For that purpose, the practical and transparent distribution of responsibilities between the competent and co-competent bodies, even from different administration levels (central, regional, local), would contribute significantly to the issues of responsibilities, multi-division, structures, and tools.

The next priority of the reform could be the cultivation of new spatial planning philosophy, which would streamline the implementation of the legal provisions without the continuous need for clarifications. Another feature of the reformed spatial planning system could be incorporating the philosophy, prin-

ciples, and processes of adaptive spatial planning. In adaptive spatial planning, spatial development plans are considered as approaches to exploring alternatives and the effects of various policies on specific urban trade-offs (Ahern, 2011). The central principle is land multifunctionality. The basis of this principle is the mixing and alternation of land uses, which provide the possibility of adaptation to climate change in the most vulnerable sectors.

The efficiency and effectiveness of this reformed spatial planning system are linked to the formulation, development, and application of modern and technology-based means, tools, and mechanisms at all scales of planning. The transformation of the spatial planning system toward a more adaptive planning approach can be based on integrating modern technologies into the reformed spatial planning system.

5. Discussion

This paper presents a framework for strengthening the resilience of Greek coastal cities against the effects of climate change. The framework is based on four stages. The first stage of the framework is focused on determining the control factors and exposure of Greek coastal cities to climate risks. The next stage concerns the identification and strengthening of fragile systems as well as the strengthening of features that reduce the vulnerability of Greek coastal cities against climate risks. The third stage is focused on strengthening stakeholders' capacities to access the systems and developing an enhanced adaptive capacity approach. The last stage of the proposed approach addresses the policies, institutional provisions, or even stakeholders' beliefs that limit coastal cities' vulnerability and adaptive capacity.

The central pillars of the proposed framework are 1) the preparation of a flexible and adaptable policy implementation framework, 2) the examination of successful countries with spatial planning systems similar to the Greek one to identify the best practices and intelligent spatial planning tools that can contribute to strengthening the resilience of Greek coastal cities, 3) the formulation of policies that will substantially and effectively strengthen the resilience of Greek coastal cities, in the context of a participatory process where the effective utilization of available information plays an important role, 4) the preparation of targeted actions for areas with unique characteristics (e.g., cultural heritage, rare biodiversity).

Implementing the proposed methodological framework creates additional value in adapting Greek coastal cities to the effects of climate change. The proposed framework aims to create new capabilities using existing skills and knowledge. The process and its elements need to be repeatable in the medium-long-term, thus allowing the building of relationships required for ensuring broad participation.

The complexity of the relationships and interdependencies between the factors that relate to urban and regional planning requires the consideration of

complex, dynamically evolving, and interrelated parameters. The use of new technologies can significantly contribute to the analysis, management, and processing of these parameters.

It is impossible to foresee with precision the developments and challenges spatial planning policies have to face. This is especially true regarding the resilience of a coastal city against the effects of climate change, as the scientific community is constantly struggling to acquire and manage the necessary data, turn them into knowledge and proceed to long-term assessments. The integration of modern technologies in spatial planning is based on the intention of city administrations to transform them into areas that offer an upgraded quality of life, regardless of pressures and crises.

Modern technologies can address these challenges under the right conditions. They could further ensure equal access to infrastructure and knowledge, emphasizing European society's smart, knowledge-based, and innovation-based development. A central advantage of modern technologies is their ability to explore available alternatives based on existing legal provisions, combined with citizens' beliefs, opinions, and preferences, so that spatial planning policies can be formulated accordingly. Moreover, the ever-increasing volume of geospatial data, together with the so-called "Big Data", can play an essential role in the formation of an adaptive model of spatial planning. In addition to the big data utilization, the model could strengthen the participation of all citizens, regardless of age, in formulating spatial planning policies. Modern technologies are considered an essential tool, capable of contributing to developing cutting-edge technological applications and tools and identifying long-term trends and weaknesses that threaten a coastal city. At the same time, they promote knowledge-based urban development by identifying and exploiting each city's strengths so that it is possible to plan its future spatial planning policies based on the principles of adaptive planning.

Fundamental to integrating modern technologies in spatial planning is cultivating a mindset that considers how modern technologies work. This type of mindset would allow researchers and public authorities to fully exploit the advantages of modern technologies while overcoming their inherent disadvantages. However, the excessive connection and association of modern technologies with policy formulation and decision-making processes is a point of vulnerability and requires all related policies to strengthen the resilience of the spatial planning policies.

The complex problems recorded in the Greek coastal cities are impossible to be solved following simple legal regulations. They require integrated spatial planning approaches, which would ensure the active participation of the local community, evaluation of all the physical, economic, cultural, and legal parameters, and direct mobilization of the bodies that participate in planning policies and their implementation. In addition, the approach spatial planning policies would follow should be based on flexibility and adaptability.

6. Conclusion

Formulating an effective coastal city adaptation strategy against climate change's effects is related to strategic and regulatory spatial planning. This indicates the need for developing the necessary legal and technological tools. The integration of these tools presupposes, among other things, the continuous gathering, analysis, and utilization of the necessary data about the relationship between coastal cities and climate change. To date, these data have been limited, often unreliable, and referring to specific periods, making it challenging to formulate future policies.

Developing policy measures for a specific coastal city is the next step in the proposed approach. It should be emphasized that each study area has its characteristics, which require different evaluations, as resilience has a different meaning for each city since each urban system has its complex and often unique characteristics.

The research about the relationships and interactions between compact cities and climate change is at the cutting-edge of the scientific dialogue as the available knowledge and information are constantly increasing. However, the answers given by the model of the compact city to issues such as the limited need for movement, lack of public free and green spaces, degraded quality of building stock, urban voids, reuse of degraded parts of the urban fabric, high residential densities, land use mixing, limiting suburbanization and urban sprawl are all issues related to the adaptive capacity of coastal cities to climate change. However, a fundamental parameter to enhancing the resilience of a coastal city is its ability to reorganize, regardless of pressures and crises.

It is pointed out that even in the Greek spatial planning system, full of pathogens and inadequacies, it is possible to improve the structural characteristics of coastal cities to mitigate the effects of climate change, strengthen their adaptive capacity and upgrade the quality of life offered through targeted interventions.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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