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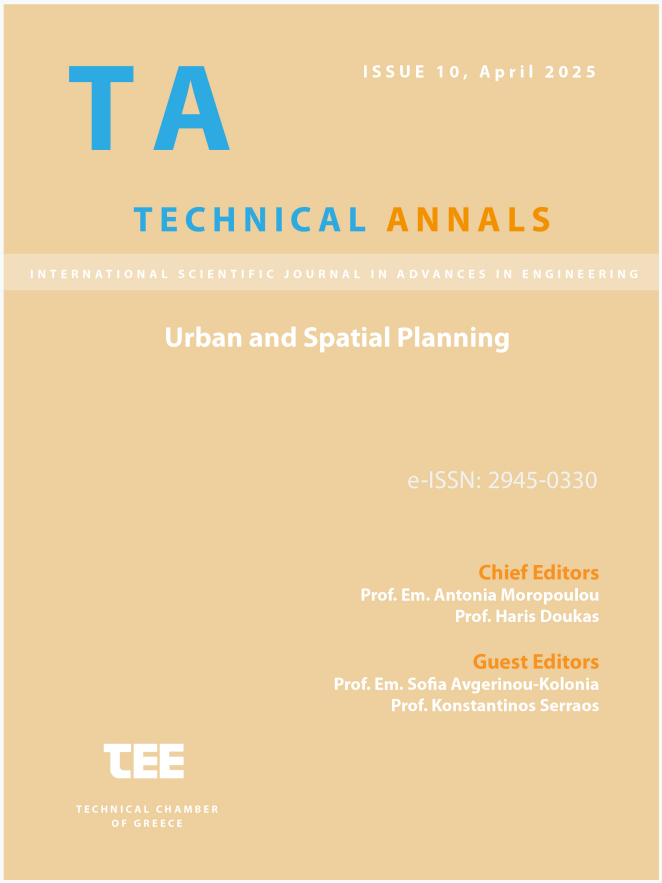

Land development as a potential factor of vulnerability. Challenges in Greece's spatial planning system

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Land development as a potential factor of vulnerability and socio-political implications. Challenges within Greece's spatial planning system

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Abstract. This paper focuses on the concept of vulnerability and explores its entanglements with spatial planning and land development, while emphasising socio-political implications. On the one hand, it traces how vulnerability has been introduced into the legislative framework of climate policies and spatial planning in Greece over the last decade. On the other hand, the paper highlights aspects of vulnerability inextricably entwined with processes of land development in Greece, path-dependencies, and contemporary transformations. This dual exploration argues that merely responding to emergencies and disasters is insufficient for addressing vulnerability in geographical space. Instead, vulnerability should be understood in relation to much more complex and enduring factors associated with modes and processes of land development. Additionally, its scope should broaden to better incorporate socio-spatial aspects. Drawing on international experiences, this paper suggests that tackling vulnerability can serve as a creative field for formulating innovative spatial policies.

Keywords: Spatial planning, Land development, Vulnerability

1 Introduction

In February 2025, the volcanic upheaval and the increase in seismicity in Santorini and the surrounding Cycladic islands brought to the fore a series of arbitrary and excessive construction activities, showing that land development associated with the increasing tourist growth has contributed to an increased risk and vulnerability of the islands against potential disasters. Over the last decade, catastrophic wildfires and floods have affected different regions of Greece: Athens-Attica repeatedly, Thessaly, Evros, Northern Evia, Rhodes, and elsewhere, leading to loss of human lives, incalculable damage to technical infrastructures, crops, buildings, residences, and businesses, and the destruction of ecosystems [1, 2]. In addition to management problems and the impacts of austerity policies, these phenomena have highlighted, in different ways and on a case-by-case basis, aspects of vulnerability in these areas related to, among other things, the ways land development took place in urban, peri-urban and rural areas and especially in coastal, island, and wildland-urban interface areas: for example, off-plan land development, informal land development, artificial coverage/sealing of land,

streams, blocking access to open and public spaces and the seashore, the organisation of technical infrastructure, etc.

The impacts of climate change have been a major concern for the European and international community in recent years. The United Nations has identified the current decade as particularly critical for the environment and the planet, calling it the "UN Decade on Ecosystem Restoration (2021–2030)". Key policy directions include land protection, land restoration, and the revitalisation of ecosystems and biodiversity, directions that also link to the UN's Sustainable Development Goals (SDGs). Similarly, the Intergovernmental Panel on Climate Change (IPCC, scientific intergovernmental panel under the auspices of the UN) reports on specific notions on land use, desertification, land degradation, and land management in relation to climate change [3]. The European Union has also emphasised the linkages between climate change with land and the environment through several influential policy documents and directives, including the EU Biodiversity Strategy for 2030, the European Green Deal, and, most recently, the Regulation (EU) 2024/1991 "on Nature Restoration" [4]. The Regulation states that at least 20% of EU land areas and their ecosystems require restoration, and it establishes goals for member states to achieve by 2050. The guidelines of the Regulation include the restoration of urban ecosystems, the enhancement of the natural connectivity of rivers and their associated floodplains, the restoration of agricultural and forest ecosystems. Each member state is required to prepare a National Restoration Plan and conduct the necessary monitoring and research to identify the measures needed to meet the established targets.

This paper focuses on the concept of vulnerability and explores its relationship with land management and development, the spatial planning system and spatial policies in Greece today. On the one hand, it traces how this concept has been introduced into the legislative framework of climate policies and spatial planning over the last decade. Through the methodological tool of document analysis [5], the paper reads the key legal documents of the National Strategy for Adaptation to Climate Change (Εθνική Στρατηγική για την Προσαρμογή στην Κλιματική Αλλαγή ΕΣΠΚΑ-ESPKA), the Regional Plans for Adaptation to Climate Change (Περιφερειακά Σχέδια για την Προσαρμογή στην Κλιματική Αλλαγή ΠεΣΠΚΑ-PeSPKA), the National Climate Law, the EU Regulation "on Nature Restoration", the Technical Specifications (Τεχνικές Προδιαγραφές) for drafting Local and Special Urban Plans, and the new Urban Planning Standards (Πολεοδομικά Πρότυπα). On the other hand, the paper contextualises document analysis by highlighting aspects of vulnerability related to processes of land development in Greece alongside their socio-political implications. To do so, the paper employs (neo-)institutional lenses in planning theory [5, 6] that address specific notions to issues of institutions, property rights, path-dependencies, and embedded practices.

This dual methodological exploration argues that to address vulnerability in geographical space, merely responding to emergencies and disasters is not enough. Instead, vulnerability should be understood in the context of much more complex, enduring factors that are intertwined with modes and processes of land development alongside their socio-political implications. Focusing on the entanglements of planning and vulnerability is crucial for at least three reasons. The first and most important is the intensifying and accelerating recorded climate changes, risks, hazards, and disasters. The second

links to the currently underway reform of drafting Local Urban Plans for nearly the entire national territory in Greece, the so-called "Constantinos Doxiadis Programme". The third meets Greece's obligation to draft a National Nature Restoration Plan, according to the respective EU Regulation. Integrating the concerns on climate vulnerability would critically inform the content of spatial planning and land restoration policies and would possibly improve their response to current major challenges.

2 On addressing vulnerability

The concept of *vulnerability* historically intertwines with the era of climate change. It may have various meanings and interpretations depending on different conceptual, theoretical, epistemological, and political contexts in which it appears [7, 8]. On the United Nations Office for Disaster Risk Reduction (UNDDR) website, vulnerability is defined as

> the conditions determined by physical, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impact of hazards

In theory, vulnerability appears as a largely internal/inherent feature and the most elusive and indistinguishable component of disasters and their management cycle [9]. Measuring and quantifying vulnerability presents challenges, as it builds itself gradually through various factors and processes, creating the conditions for increasing or maximising the intensity, scope, and extent of a disaster [7]. Interactions of vulnerability regimes with hazards are believed to create risks and disasters [10, 11].

Different forms of vulnerability have been studied: human, physical, environmental, economic, economic, social, political, technological, ecological, structural, systemic, institutional, etc. [12, 9]. Very often these are intertwined with each other. Moreover, they become intertwined with geographical *space*, as a field with material and immaterial dimensions produced by society and its modes of production and their genealogies. The emphasis on space and the spatial aspects of vulnerability makes sense, as the intensity and scope of the risks and disasters largely depend on the physical and socio-historical characteristics of the areas where they occur; they are mediated by the spatial organisation, the form, and the materials of the built environment, land rights, and the spatialities of social practices [13–15]. Understanding the mechanisms and processes that produce vulnerability and expose an area to risks, disasters, and the impacts of hazards is crucial [16].

Hence, when it comes to vulnerability, the parameter of *time* is also important, as vulnerability produces itself gradually, over a long period, creating conditions that maximise the intensity and scope of disasters and crises when these occur [11]. At the same time, *space* is equally important, as vulnerability produces itself (in space) through particular processes and social practices.

Spatial planning can, arguably, hold a crucial role in tackling vulnerabilities, mitigating climate change impacts, reducing disaster risk, and overall contributing to shaping more resilient areas [17, 10]. The provision of strategic guidelines, the delineation

of land uses, land restoration, the allocation of development rights, the delimitation of settlements and urban expansions, the protection of natural and environmental elements, the integration of nature-based and climate-resilient infrastructure can become tools to tackle vulnerabilities and contribute to climate action and resilience [18, 19].

Addressing vulnerability requires innovative spatial policies that tackle climate challenges alongside spatial planning. For instance, a policy aiming o reduce artificial soil sealing can be found in France. Called the "Zéro Artificialisation Nette / Zero Net Artificialisation" and formulated by the Institute France Stratégie,[1] the policy was introduced as part of the 2018 French Biodiversity Plan, coming into effect through the National Climate Law in 2021. The policy identified artificial soil sealing as a problem caused by continuous urbanisation, suburbanisation, urban sprawl, and infrastructure developments [20]. The aim was, on the one hand, to reduce by half the rate of "artificialisation" of natural and agricultural land by 2031 (as compared to the previous decade 2011–2021) and, on the other hand, to entirely halt further "artificialisation" by 2050. Despite extensive consultations, the policy has provoked strong opposition since then. Another relevant case is the constitutional and legislative initiatives for protecting nature and natural elements, usually coming from countries outside today's "developed" world. One of the best known is the protection of Nature's Rights in the 2008 Constitution of the Republic of Ecuador, which recognises that, along with people, communities, and nations, Nature ("Mother Nature/Pachamama") has guaranteed rights.[2] [21] Similar legislative initiatives include the 2010 law in Bolivia recognising Mother Earth's rights as a collective subject and the recognition of river rights in Colombia, India, and New Zealand [22].

It should be stressed that these cases are suggestive of a broad horizon of alternatives for addressing vulnerability through creative spatial policies. They are also indicative of the direct and profound entanglements of land issues with climate vulnerability, nature restoration, and spatial planning. The main hypothesis of this paper is to address the processes of land management and development in Greece, with their specific characteristics, path-dependencies, and contemporary transformations, as potential factors that produce vulnerability in space. This connection could inform the framework of spatial planning, climate and spatial policies in innovative and creative ways that address the contemporary challenges of the climate crisis era.

3 Tracing the notion of vulnerability in the framework of spatial planning in Greece

The notion of vulnerability was introduced in the last decade in the legislative framework of climate policies and spatial planning in Greece in the context of institutional

[1]See in detail on the France Stratégie website:
https://www.strategie.gouv.fr/en/publications/objectif-zero-artificialisation-nette-leviers-proteger-sols
[2]See: https://pdba.georgetown.edu/Constitutions/Ecuador/english08.html

and administrative steps undertaken by all EU member states to mitigate the impact climate change.

3.1 Legislative adaptations to climate change

In the mid-2010s, the SYRIZA government legislated for the obligation of the central administration and the 13 Regions to draft climate change adaptation plans, following the ratification of the Paris Agreement (Law 4426/2016, Government Gazette 187A) under the United Nations Framework Convention on Climate Change (UNFCCC). Vulnerability, as a concept, appeared in Law 4414/2016 (Government Gazette 149A), specifically, in art. 42–45. This law introduced the National Strategy for Adaptation to Climate Change (Εθνική Στρατηγική για την Προσαρμογή στην Κλιματική Αλλαγή ΕΣΠΚΑ-ESPKA) (art. 42), the Regional Plans for Adaptation to Climate Change (Περιφερειακά Σχέδια για την Προσαρμογή στην Κλιματική Αλλαγή ΠεΣΠΚΑ-PESPKA) (art. 43), and the National Council for Adaptation to Climate Change.

One of the general objectives of the National Strategy (ESPKA) was the "analysis of the vulnerability of economic sectors and social activities and the assessment of the impacts of climate change on different sectors of economic and social activity" (art. 42, par. 2b). A second objective was the "identification of priority sectors that need climate change adaptation measures, based on the vulnerability analysis" (art. 42, par. 2c). As such, vulnerability does not seem to have a direct spatial relationship for ESPKA.

A more evident geographical dimension of vulnerability appears in the Regional Plans for Adaptation to Climate Change (PESPKA), which identify and prioritise climate change adaptation measures and actions for the country's 13 Regions. One of their objectives was the "Assessment of climate changes expected in the Region and the analysis of the climate vulnerability of individual sectors and geographical areas" (art. 43, par. 3c). Subsequently, in PESPKA's technical specifications (as delineated in the Ministerial Decision no. 11258/2017, Government Gazette 873B), the analysis stage required an assessment of the vulnerability of the natural and man-made environment for each Region. Paragraph 2.2 "Morphological and topological features" requested the identification of important and vulnerable landscape elements. Paragraph 3 "Assessment of expected climate changes in the Region and analysis of the climate vulnerability of individual sectors and geographical areas", asked for an analysis of vulnerability for the Region's geographical areas and different sectors.

These sectors refer to the National Strategy for Adaptation to Climate Change, published in 2016. Many sectors have demonstrated a potential spatial and environmental dimension (e.g., agriculture and livestock, biodiversity and ecosystems, water resources, tourism, energy, infrastructure and transport, the built environment, etc.). For instance, regarding the "coastal zones" sector, the National Strategy refers to the risk of sea level rise and proposed a "managed retreat" from the coastline, protection zones between the coastline and the residential areas, the limitation of residential and business developments along coastal areas, land use restrictions, relocations of buildings and facilities, etc. (ESPKA, 2016: pp. 49–50).

More recently, an explicit definition of vulnerability was included, among others, in the National Climate Act. Law 4936/2022 (Government Gazette 105A) "National

Climate Law—Transition to climate neutrality and adaptation to climate change, urgent provisions to address the energy crisis and protect the environment" was enacted during the New Democracy government as a follow-up to the European Climate Law (2021) (EU Regulation 2021/1119), which, in line with the European Green Deal, aimed at a climate-neutral European Union by 2050 and the bold reduction of greenhouse gas emissions by 2030 (more than half of 1990 levels). In the introductory articles, vulnerability was defined as:

> the tendency or predisposition of a system or sector to be adversely affected by climate change. Vulnerability encompasses a range of concepts and elements, including susceptibility or vulnerability to damage and lack of capacity to cope with and adapt to climate change (art. 3, par. 14)

The National Climate Law reformulated provisions of the previously mentioned Law 4414/2016, identifying similar sectors as susceptible to vulnerability, including health, tourism, agriculture and livestock, forestry, energy, insurance, infrastructure and transport, the built environment, coastal zones, the protection of biodiversity, ecosystems, and water resources, and the protection of cultural heritage. A further reference to vulnerability is recorded in Chapter C "Policies and Measures", which stated that climate change adaptation may be addressed through measures and policies "to enhance resilience and reduce vulnerability in all sectors of the economy, the natural environment and biodiversity" (art. 10, par. 3a).

However, the National Climate Law does not sufficiently incorporate the spatial dimension and its importance for vulnerability issues, except in a fragmentary and incidental fashion. One telling example is art. 21 "Transforming the development model of islands and their transition to climate neutrality". Although this article referenced the environmentally sensitive island area, which is predominantly affected by phenomena of excessive tourism and building development, the desired "transformation of the development model" did not include any mention of space, land development, tourism development, the natural resources, the pressures on technical and social infrastructure, or the landscape. Instead, this "new model" referred exclusively to the linkages with the mainland electricity grid, electrification, energy saving, and the upgrading of maritime transport.

3.2 Technical Specifications for urban planning

Apart from legislation on climate change adaptation, the concept of vulnerability appears sporadically in the Technical Specifications (Τεχνικές Προδιαγραφές) for the Local and Special Urban Plans issued in 2021 and 2022 respectively. As can be noted, neither the current primary law of spatial planning (Law 4759/2020, Government Gazette 245A) nor the previous one (Law 4447/2016, Government Gazette 241A) mention the notion of vulnerability. This, nonetheless, does not mean that they are indifferent to addressing vulnerabilities through planning. It is worth noting that Law 4447, since 2016, has provided for the drafting of Special Urban Plans (the planning instrument introduced during the country's debt crisis to facilitate strategic investments and exemptive planning) to address the consequences of natural disasters. Consequently, Law 4759/2020 further extended the scope of Special Urban Plans for areas in "the need for

rapid completion of urban planning [...] due to critical spatial problems that require immediate response or prevention of the creation of *fait accompli* situations due to a lack or inadequacy of urban planning" (art. 8, par. 1a).

The Technical Specifications for both the Local Urban Plans (No. 72343/1885/2021, Government Gazette 3545A) and the Special Urban Plans (No. 6015/136/2022, Government Gazette 510B) link vulnerability primarily to civil protection, emergencies and disasters. Both ministerial decisions require Chapter A8 "Identification of an Emergency Management Network (escape routes, shelters, etc.)" and Map A8 "Hazards and Civil Protection". The elements of the map include "vulnerability to natural disasters (fires, floods, landslides, earthquakes, etc.)" and "vulnerability to technological disasters and immediate response to emergencies involving environmental degradation and human health risks".

Although the references to civil protection and disasters are identical between the Local and the Special Urban Plans, qualitative differences between the two planning instruments remain. In contrast to the Special Urban Plans, the Local Urban Plans are instruments of comprehensive planning with reference to the territory of a municipality or a municipal unit. The Technical Specifications for the Local Urban Plans further provide that, when required, these plans can be more detailed in the analysis of "vulnerability to natural or technological disasters". Unlike the Special Urban Plans, the Local Urban Plans explicitly aim to align with the principles of sustainable development and, among other things, to regulate off-plan land development by designating rational land uses and development regulations in the entire territory, manage land as a finite natural resource, limit urban expansions and urban sprawl, and promote climate change mitigation and adaptation as well as resilience and protection from risks and hazards.

3.3 Urban Planning Standards

The most extensive approach to vulnerability in the legislative framework of spatial planning can be found in the recently revised Urban Planning Standards (Πολεοδομικά Πρότυπα) (Ministerial Decision no. 32892/1414/2024, Government Gazette 200D). Both the Technical Specifications and the Urban Planning Standards are employed for the drafting of urban planning studies. Beyond vulnerability, this legal text also defines the concepts of disaster risk, hazard, exposure, and capacity. The definition of vulnerability accords more or less to that of the UN Office for Disaster Risk Reduction:

> Vulnerability refers to the set of conditions, as determined by social, economic and environmental factors, that make individuals, social groups, buildings, infrastructure, physical assets or systems vulnerable to the impacts of hazards (art. 2, par. 12c)

In the same context, vulnerability directly links to urban planning along with planning's obligation to take into account and deal with vulnerability:

Existing vulnerability to natural and man-made hazards must be taken into account in urban planning in order to reduce the overall risk of disaster (ibid.).

Of direct relevance are the "Quality Guidelines for Urban Planning" in art. 4. The principles of sustainable development, mitigation of and adaptation to climate change, strengthening resilience against risks and disasters, and ensuring a good quality of life

for—and health and safety of—all citizens are here reaffirmed. Important guidelines for planning to align to are also mentioned, including the "economy in the use of land as a natural resource by limiting residential expansions, applying the compact city model, and promoting organised land development", "limiting off-plan land development", "promoting climate change mitigation and adaptation actions", and "enhancing environmental resilience through appropriate planning".

In particular, par. 15 of art. 4 offers extensive linkages of planning to vulnerability, referring to the safety and protection of the life, health, and property of citizens, the natural environment, natural resources, and infrastructures against natural and technological hazards, the effects of climate change, pollution, and all kinds of nuisance, to avoid disaster risks, improve the operation of urban systems in emergency conditions, and facilitate reconstruction and efficient rehabilitation. The five subsequent guidelines include: (a) the prevention, reduction, and management of disaster risk; (b) land use planning with particular reference to areas of high population concentration or activity intensity, coastal areas, island areas, and wildland-urban interface areas; (c) the adaptation of planning to flood risk management plans; (d) preventive works and interventions to avoid the occurrence and reduce the impact of hazards; and (e) the creation of appropriate road and pedestrian escape routes, and shelter and camping areas.

The concept of vulnerability appears only in the definitions section (art. 2) and not at all in other articles. Some references to "critical and vulnerable functions in an emergency" (art. 6, par. 16.4) relate to civil protection and cases of earthquakes. However, although not explicitly linked to the concept of vulnerability, the qualitative guidelines, as mentioned above, delineate a general framework for addressing vulnerability through urban planning. A critical question is whether and to what extent these qualitative guidelines translate to binding urban planning that addresses vulnerability on the ground.

Finally, the Urban Planning Standards methodologically define another significant tool, the "carrying capacity" (φέρουσα ικανότητα)—a tool that was introduced in Law 4964/2022 (Government Gazette 150A).[3] The Standards include technical guidelines for drafting Carrying Capacity Assessment Reports (art. 4, par. 3d), which planners/planning teams use to identify Spatial Systems in space and assess their carrying capacity by using Key Sustainability Indicators. Although useful as a tool, several questions arise here regarding carrying capacity. The first one concerns the methodology and definition of Spatial Systems and how planners can designate them. A second one relates to the ambiguity of drawing the boundaries of Spatial Systems, which raises further issues of manipulating data and calculations to derive "tolerable limits". Even more so, for cases of Special Urban Plans where these parameters are determined by the private sector as prime instigators. A third question reflects on the methodological assumptions for quantifying qualitative data through indicators. For example, Annex 4 on Key Sustainability Indicators hints at a spatial policy to limit soil sealing. It provides

[3]According to article 64 of law 4964/2022, "[t]he carrying capacity of a spatial system is defined as the maximum tolerable limits of stresses and/or changes in the conditions prevailing in it, beyond which there is no longer a balance between the natural environment, the economy, and the society living in it, resulting in excessive or irreversible damage to the natural environment, and negative pressures on the man-made environment, and society."

that for off-plan land development in island, mountainous, disaster-stricken, and coastal tourist Spatial Systems, the soil sealing cannot exceed 10%. For metropolitan, urbanized, and other Spatial Systems, the soil sealing cannot exceed 15%. The usefulness and effectiveness of such indicators remain to be seen.

Hence, the Urban Planning Standards attempt some important first steps to address vulnerability both with qualitative guidelines and some quantitative tools and indicators. This realisation urges a reflection on how to envisage land development as a potential vulnerability factor, as a theoretical understanding and as a driver of policy-making.

4 Socio-political implications of dealing with vulnerability

We argue that addressing vulnerability through spatial planning is not a mere legislative/technical or scientific/technical issue. Instead, dealing with vulnerability entails social, economic, and political dimensions and stakes related to land management and development, as inextricably entwined with specific local characteristics, social dynamics, and practices.

4.1 Path-dependencies and recent transformations of land development

The first point that seems important to highlight is the understanding of path dependencies in land development processes in Greece and their contemporary transformations. The particular entanglements between land development and land ownership on the one hand and spatial planning on the other, as well as the central importance of land, property, and construction for the Greek economy society over time, have been thoroughly documented [23]. Karadimitriou and Pagonis [24] write about a "persistent dualism" in the system of planning and land development, between formal frameworks and informal processes and practices. They argue that since the post-dictatorship era (Μεταπολίτευση/Metapolitefsi), and until recently, despite ups and downs from time to time, successive reforms, regulations, and plans have not essentially reversed trajectories and legacies from the past in terms of land development processes. Different "development pathways" continue to coexist, albeit in various terms, including in-plan land development, off-plan land development, and informal land development. Wassenhoven [25] has introduced the term "compromise planning" to describe an ongoing practice of negotiation, bargaining, and mutual interdependence between individuals and groups, the state and public administration around allocating development rights. From this perspective, compromise entails successive exceptions, derogations, and privileges involving specific areas, economic interests, and differentiated social groups.

Although these findings can hardly be exclusive to Greece, it is evident that the interrelations between land, property, construction issues, and spatial planning show strong path-dependencies. As argued, off-plan and informal land development during the post-war era rested on an inextricable, implicit, yet profound consensus between the state, various social groups, and professional groups [23]. The socially powerful institution of private property (as created by society and as intertwined with families, symbols, perceptions, and social meanings) and the material benefits potentially derived

from the exploitation of land and real estate have, over time, supported demands for the residential expansion of city plans, increased building coefficients, off-plan land development—even land development in forest land—the regularisation of unauthorised constructions, and the continuation of informal land development, both for residential and business activities related to tourism and leisure. These factors support the safeguarding and extension of development rights within or outside the framework of spatial planning in a situation where more or less every piece of land, urban, peri-urban, or rural, can be treated as land potentially exploitable for development. Consequently, this creates critical epistemological, legislative, and constitutional challenges with predominantly political dimensions [26, 27].

For many decades, the allocation of development rights has mainly been associated with micro-ownership and/or the claims of cooperatives, groups of informal settlers, etc. Formal spatial policies still treat land as a predominantly economic resource, potentially available for development. An indication is the fragmented, diffuse off-plan development in many parts of the country, particularly in island and coastal areas, because of the dynamics of tourism development and holiday homes.[4] Recently, the government has repeatedly attempted to identify ways to further relax the restrictions of off-plan land development, for instance, through the designation of the rural road network and bypassing the decisions of the Council of State.[5]

Over the last thirty years, and with an accelerating tempo since the country's debt crisis, the allocation of development rights increasingly targets large-scale real properties, large-scale investments by domestic or international funds, and monopoly-type land developments. This new mode of allocating development rights offers much more privileged development frameworks and links to major transformations of the real estate market in Greece. The development of large-scale, organised tourist accommodation projects (οργανωμένοι υποδοχείς) and large-scale urban development projects have become possible due to the planning instruments such as the Special Urban Plans. However, these trends raise critical questions as to their exemptive provisions [30] for intensive development and privileged building regulations (e.g., in terms of distances from the coastline, maximum building heights, and restrictions on the protection of the environment and cultural heritage) in areas where the priority should possibly be protection of ecosystems and undeveloped land as a finite resource.

4.2 Emphasising the socio-spatial aspects of vulnerability

Another important point for expanding the scope and content of vulnerability is its connection to socio-spatial issues related to inequality. The rescaling of real estate, construction, and land development systems, along with new privileged and exemptive modes of allocating development rights, aligns with neoliberal trends that intensify and exacerbate socio-spatial inequalities. Many of these inequalities arise from real estate

[4]Recent studies use spatial analysis tools and geospatial data to record the accelerating "impermeability" of coastal areas due to soil sealing [28]

[5]Even foreign direct investments are largely driven to real estate and tourism development as recent studies show [29]

dynamics, changes in land uses, rising land prices and housing costs, gentrification and touristification, land privatisation, exclusions, evictions, and so on.

More broadly, the production of geographical space within capitalism, especially in neoliberal contexts, is intertwined with processes and mechanisms that create and sustain inequalities, segregation, and exclusion based on class, race, age, gender, and other factors. These inequalities reflect the unequal access to resources and opportunities for social mobility. The spatial manifestations of inequality reveal differences in housing conditions, access to social and technical infrastructures, green spaces, energy resources, and the distribution of welfare provisions, amenities, and services. These disparities significantly affect standards of well-being, public health, and everyday life.

For instance, research on Athens/Attica has shown the geographies of inequality, segregation, and social deprivation by analysing variables such as income, employment, housing, and education [31, 32]. The geographical representation of this statistical data highlights areas where poverty, multiple forms of deprivation, and social exclusion tend to concentrate. These patterns display interesting overlaps and connections—with evident yet non-linear ways—to climate-related vulnerabilities, including the surface temperature during the summer and the covered stream networks [33].

If we recognise that various forms of vulnerability are interconnected, it becomes important to address the "cumulative socio-spatial vulnerability" [33] of particular social groups, communities, or specific areas that are exposed to risks and disasters. This cumulative vulnerability significantly affects the impact of a heatwave, a wildfire in a wildland urban interface (WUI), a flooding event, or an infrastructure failure. From this perspective, it is often the case that those who are socially deprived are the most susceptible to the consequences of hazards—again with non-linear ways. Understanding this interconnectedness highlights critical issues related to social and spatial justice [34, 35]. Hence, social and economic factors and processes are essential for assessing vulnerability, alongside environmental and climate characteristics, and these aspects cannot be considered in isolation.

However, the analysis of how vulnerability has been incorporated into the legislative framework of climate policies and spatial planning in Greece reveals that both the social and economic dimensions of vulnerability and path-dependencies regarding land development are overlooked or undervalued. Similarly, upon closer examination of the EU Regulation 2024/1991 "on Nature Restoration", it is noted that, out of 33 examples of restoration measures listed in Annex VII, only three are directly related to land use and spatial planning.[6] Land management and development are not explicitly addressed as valuable fields for nature restoration, nor are they identified as contributing factors to vulnerability. Additionally, the social and economic aspects of vulnerability are not mentioned. Overall, determining how social and economic aspects of vulnerability and land development issues can inform both spatial planning and climate policies aimed at enhancing resilience remains a challenge.

[6]These examples are no. 17, "Increase the agricultural area subject to agro-ecological management approaches", no. 31, "Increase urban green spaces with ecological features", and no. 33 "Convert brownfield sites, former industrial areas, and quarries into natural sites"

5 Conclusions

This paper has attempted to explore how the concept of vulnerability has been introduced into the legislative framework of climate policies and spatial planning in Greece during the last decade. We argue that addressing vulnerability in geographical space is not only about responding to emergencies and disasters. Instead, vulnerability should be understood together with broader, complex, and long-standing factors and processes of land development that are not independent but inherent to its creation, as well as taking into consideration socio-political implications. It seems necessary to understand the contribution of these factors to the susceptibility of communities, resources, and systems to the impact of hazards, the intensity of risks, and disasters.

This exploration argues for a more meaningful and direct link between climate and spatial planning policies. On the one hand, this interconnection concerns the information and updating of climate policies (from the National Climate Law to the Nature Restoration Plan) with a focus on the parameters of geographical space, land management, and land development. Due to the multi-layered and highly differentiated spatial impacts of climate change, these parameters are crucial for understanding and addressing vulnerability regimes and seeking resilience policies. On the other hand, this interconnection involves a bolder and more integrated shift in the focus of spatial policies and planning to address vulnerability and pursue resilience beyond issues of civil protection and post-disaster management. In other words, towards tackling the factors and processes that lead to vulnerability, rather than their outcome.

There seems to be a fundamental contradiction. On the one hand, climate policies and spatial planning in Greece (including the Local Urban Plans) are called upon to identify vulnerability regimes and propose measures to address them in a wider context of actual and threatened disasters. At the same time, various spatial policies for in-plan and off-plan land development, informal land development, and excessive development in fact push for more soil sealing, land consumption, and the securitisation and expansion of more development rights for various scales of invested capital.

The awareness of this contradiction may contribute to the realisation that today it makes sense to explicitly challenge the power of development rights and to limit their allocation in four key directions: (a) regarding the drastic minimisation of off-plan land development; (b) regarding the residential expansions and the zones to receive extra development in the context of the drafting of the Local Urban Plans; (c) regarding large-scale developments with the support of the Special Urban Plans and their various alterations; and (d) regarding the drafting of the Natural Nature Restoration Plan. In other words, with reference to all scales of invested capital and diversified social groups with all the in-betweens.

Spatial policies can benefit from innovative and radical policies derived from international experiences, as well as from creative approaches that consider the specific features of land development processes in Greece. This includes recognising path-dependencies, contemporary transformations, and socio-political implications. To achieve this, it may be necessary to move away from entrenched views that regard land, soil, and nature as merely exploitable commodities. Instead, we should understand them as finite

resources that are essential for ecosystems and for the well-being of present and future generations.

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