Megaron, Vol. 21, No. 3, pp. 427–437, September 2026

Megaron
https://megaron.yildiz.edu.tr - https://megaronjournal.com
DOI: https://doi.org/10.14744/megaron.2026.75002

Article

Integration of climate adaptation into spatial planning in Turkish cities: A comparative evaluation

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ARTICLE INFO

Article history
Received: 26 February 2026
Revised: 21 July 2026
Accepted: 12 October 2026

Key words:
Climate change adaptation; spatial planning; statutory planning; local governance; Türkiye.

ABSTRACT

Climate change adaptation is increasingly recognized as a core concern of spatial planning, yet the extent to which local adaptation priorities are reflected in statutory land-use decisions remains uncertain. This study evaluates climate-spatial integration at the local level in Türkiye and asks: To what extent are the thematic priorities in local climate adaptation plans reflected in the existing statutory spatial planning framework? A multi-source qualitative comparative research design was applied to four metropolitan municipalities—Sakarya, Konya, Muğla, and Samsun. Directed qualitative content analysis of the 2025 Local Climate Change Adaptation Strategy and Action Plans (LCCASPs) was conducted in NVivo 15 using five themes and fourteen sub-themes derived from the literature and international best practices. The results were then contextualized through qualitative document analysis of the corresponding macro-scale statutory spatial plans enacted between 2015 and 2018. The analysis identifies strong recognition of climate risks in the LCCASPs but limited explicit translation of these priorities into binding spatial plan provisions. The findings therefore indicate a baseline policy-implementation gap. Climate Law No. 7552 creates an emerging national framework for stronger coordination and local climate planning; however, effective integration will depend on operational mechanisms that connect climate-risk evidence, institutional coordination, and statutory plan-making.

Cite this article as: Kazancı, G., & Gülümser, A. A. (2026). Integration of climate adaptation into spatial planning in Turkish cities: A comparative evaluation. Megaron, 21(3):427–437.

INTRODUCTION

Cities are increasingly on the front lines of the climate crisis. The density of population, infrastructure, and economic functions within urban areas amplifies their exposure to heat stress, extreme weather events, and various forms of environmental degradation. The role of spatial planning has transformed from guiding land-use decisions to anticipation of climate risks and supporting the creation of more resilient urban environments (Carter et al., 2015; Gradinaru & Hersperger, 2019; Mabon & Shih, 2021; Hurlimann et al., 2021).

AIM AND OBJECTIVES

This study examines how climate adaptation priorities can be translated into spatial planning at the local level. Its main aim is to develop and apply an analytical framework that

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distinguishes thematic recognition of climate risks from their spatial and regulatory operationalization. This distinction is important because identifying risks within strategic documents does not necessarily alter land-use designations, plan provisions, or development controls (Hurlimann et al., 2021; Berrang-Ford et al., 2019).

Accordingly, the study addresses the following main research question: "To what extent are the thematic priorities identified in the 2025 local climate adaptation plans of selected metropolitan municipalities reflected in their existing statutory spatial planning frameworks?"

Two sub-questions support the main research question:

- What thematic and operational indicators can be derived from the literature and international practice to evaluate climate-spatial integration?
- How do the distinct socio-ecological conditions and statutory planning priorities of the four cases shape the interpretation and potential spatial operationalization of adaptation themes?

SCOPE AND METHODOLOGY

The study focuses on local climate-policy integration in Türkiye. It examines the 2025 Local Climate Change Adaptation Strategy and Plan (LCCASP)s for Sakarya, Konya, Muğla, and Samsun together with the corresponding macro-scale statutory spatial plans enacted between 2015 and 2018. Because the statutory plans predate the LCCASPs, the comparison is not treated as a causal test of policy influence. Instead, it establishes a baseline assessment of whether and where the new adaptation priorities correspond to the existing spatial planning framework. The four cases were selected because they formed the metropolitan pilot set for which formal local adaptation plans were completed in 2025 and because they represent contrasting geographic, economic, and climate-risk contexts.

A multi-source qualitative comparative design was used. First, analytical indicators were derived from the literature and international planning examples. Second, the four LCCASPs were coded in NVivo 15 through directed qualitative content analysis. Third, the corresponding statutory spatial plans were reviewed through contextual qualitative document analysis to identify relevant land-use priorities, plan provisions, and legal-administrative constraints. The combined analysis enables a structured comparison between strategic adaptation intent and its potential spatial operationalization (Creswell & Poth, 2016; Santo-Tomás Muro et al., 2022).

Linking Climate Change Adaptation with Spatial Planning

Theoretical framework: climate-spatial integration

Climate-spatial integration is shaped by the relationship between strategic policy documents and statutory plans. Strategic or thematic documents organize cross-sectoral objectives—such as transport, water, energy, disaster risk, and climate action—whereas statutory spatial plans translate public objectives into territorially defined land-use decisions and development controls. Although this relationship varies among planning systems, integration depends on whether strategic priorities become spatially explicit and are embedded in instruments that guide or regulate development (Walmsley & George, 2005; Taşan-Kok & Gielen, 2010; Van den Hoek et al., 2020).

In Türkiye, environmental or territorial plans, master development plans, and implementation plans form the statutory spatial hierarchy under Zoning Law No. 3194 and the Spatial Plans Construction Regulation. Climate strategies operate as cross-sectoral policy documents that must be coordinated with this hierarchy rather than as a superior tier of spatial plan. This distinction is central to the present study because thematic consistency alone does not demonstrate spatial integration; integration requires translation into mapped decisions, plan provisions, implementation responsibilities, or development controls.

Climate-responsive planning relies on diagnostic and anticipatory tools. Vulnerability assessment identifies socio-spatial sensitivity and adaptive-capacity deficits; climate-risk mapping locates exposure and potential impacts; and scenario modelling enables planners to test alternative land-use and infrastructure pathways under uncertainty (Carter et al., 2015; Adams et al., 2017; IPCC, 2022). When these tools are linked to spatial data and statutory decision-making, they can support the prioritization of development boundaries, infrastructure investments, ecosystem protection, and risk-sensitive design (Füssel & Klein, 2006; Kruse & Pütz, 2014).

A climate-responsive planning framework therefore combines regulatory measures, technological and data-based tools, nature-based solutions, and participatory governance. Local knowledge and stakeholder participation are particularly important for identifying place-specific vulnerabilities and improving the legitimacy of adaptation priorities (Nalau et al., 2018). The analytical challenge is to determine whether these elements remain general policy commitments or are translated into spatially specific and implementable planning provisions.

International Best Practices

To translate the theoretical discussion into operational indicators, the study reviewed planning experience in Rotterdam, Liverpool, and Seattle. These cases were selected because they represent different geographic and governance contexts and were among the cities that progressively institutionalized climate adaptation between the mid-2000s and early 2010s. The review focused on how climate risks were connected to spatial visions, design guidance, infrastruc-

ture priorities, social equity, and implementation instruments rather than treating the cities as directly comparable models for Türkiye (Kazancı et al., 2026).

Rotterdam provides a prominent delta-city example in which sea-level rise, intense rainfall, drought, and flood risk have informed long-term resilience strategies. The Rotterdam Climate Change Adaptation Strategy emphasizes adaptive design, water-sensitive urban development, social resilience, and capacity building, while subsequent spatial strategies connect hydrological risk to area-based design and investment priorities (City of Rotterdam, 2013). This case informed the indicators for strategic visioning, spatial representation, climate-adaptive design, and water-sensitive planning.

Liverpool illustrates the relationship between post-industrial regeneration, green infrastructure, flood resilience, and the transition to a low-carbon economy. Its net-zero action framework and statutory Local Plan combine climate mitigation and adaptation objectives with development-management policies, infrastructure planning, and environmental protection (Liverpool City Council, 2020; 2022). The case informed the indicators related to nature-based planning, technological and analytical tools, sustainable urban systems, and the spatial implementation of climate objectives.

Seattle represents a multi-hazard West Coast context in which heat, flooding, water-resource pressure, infrastructure resilience, public health, and equity are addressed through climate preparedness and comprehensive planning. Its plans demonstrate how community health and social justice can be linked to spatial investment and land-use priorities (City of Seattle, 2018; 2022). The case informed the social-resilience indicators and the assessment of whether adaptation benefits and infrastructure are directed toward vulnerable communities.

Planning and legal context in Türkiye

The Turkish spatial planning system is principally governed by Zoning Law No. 3194 and the Spatial Plans Construction Regulation (Republic of Türkiye, 1985; 2014). Statutory plans operate at several scales, including environmental or territorial plans, master development plans, and implementation plans. The documents examined in this study are the relevant macro-scale statutory plans for each case; their formal scale varies according to the planning framework applicable to the province or planning region. National and local climate strategies have historically developed on a parallel policy track, creating a coordination challenge between sectoral climate objectives and legally binding land-use decisions.

Statutory spatial plans have binding regulatory effects on land use and development, whereas the 2025 LCCASPs were prepared as strategic policy documents and were not incorporated into the older plans examined in this study. The enactment of Climate Law No. 7552 in July 2025 changed this institutional setting. Article 7 requires public policy documents to take national climate strategies into account, establishes provincial climate coordination boards, and requires province-wide local climate action plans; the transitional provisions set 31 December 2027 as the initial deadline for their preparation and for the adaptation of relevant planning instruments. These provisions create an emerging legal basis for coordination, but the Law does not itself specify how adaptation priorities must be translated into zoning designations, plan notes, development controls, or building parameters. The study therefore evaluates the documentary gap as a baseline condition and distinguishes between a newly established legal mandate and its still-developing spatial operationalization (Republic of Türkiye, 2025).

Conceptual Synthesis

This study synthesizes the international planning lessons with the legal and administrative conditions of Türkiye. Its central proposition is that climate-spatial integration cannot be assessed through thematic similarity alone; it requires evidence of a bridge between strategic intent and spatial or statutory operationalization. The framework therefore evaluates both the presence of adaptation themes and the form in which they could influence mapped decisions, plan provisions, design standards, implementation responsibilities, or development controls.

The 'local level' is conceptualized as a scalar interface at which global climate agendas, national legislation, metropolitan governance, and place-specific spatial conditions intersect. Cities may act as important nodes of climate governance, but their capacity to translate policy into land-use outcomes is mediated by national legal hierarchies and institutional arrangements (Bulkeley & Betsill, 2005). Metropolitan municipalities are therefore examined as the arena in which broad adaptation objectives encounter locally specific risks and statutory planning instruments.

Focusing on this interface makes the policy-implementation gap analytically visible. The international cases demonstrate several ways of connecting climate knowledge to spatial instruments, whereas the Türkiye cases reveal whether comparable connections are identifiable within the documents examined. The comparison is not intended to transfer a single model, but to identify the operational conditions under which adaptation priorities can become spatially specific and implementable.

The analytical indicators were developed to assess 'operationalization': whether a strategic climate objective is expressed in a form capable of informing spatial decisions. Operationalization may be demonstrated through mapped risk zones, growth boundaries, land-use designations, plan

notes, design codes, infrastructure priorities, implementation responsibilities, or monitoring arrangements linked to spatial planning.

The framework comprises five themes and fourteen subthemes used as child codes in the NVivo analysis (Table 1). Table 1 also identifies the conceptual and case-based sources of each indicator and defines its expected form of spatial operationalization in the Türkiye context.

The indicators provide a common analytical lens for examining the four LCCASPs and for contextualizing their relationship with statutory spatial plans. They distinguish the identification of a climate issue from its translation into site-specific, implementable, or legally relevant planning provisions.

MATERIALS AND METHODS

Research Design

This study adopts a multi-source qualitative comparative research design. The design compares four metropolitan cases through a common analytical framework while retaining the contextual differences among their socio-eco-

Table 1. Climate-spatial adaptation indicators and their operational basis

Main theme	Sub-theme (child-codes)	Definition, Spatial Operationalization, and Source Basis
Risk Assessments	Risk assessments	Identification of socio-ecological vulnerabilities (e.g., floods, heatwaves, and drought) and their translation into spatial evidence or base maps for planning (Carter et al., 2015; IPCC, 2022).
Strategic Visioning	Detailed scenario	Use of climate projections and alternative futures to inform long-term growth boundaries, infrastructure choices, and land-use scenarios (Adams et al., 2017; City of Rotterdam, 2013).
Spatial & Design-Based Adaptation	Spatial representation	Explicit translation of climate risks into mapped boundaries, overlays, land-use designations, or plan provisions (Hurlimann et al., 2021; Liverpool City Council, 2022).
	Climate-adaptive design practices	Development of enforceable or implementable design guidance, such as permeable surfaces, green roofs, cooling measures, and water-sensitive urban design (City of Rotterdam, 2013; Hurlimann et al., 2021).
Social Resilience	Community health	Spatial interventions that protect public health from heat, flooding, and other climate extremes (City of Seattle, 2022; IPCC, 2022).
	Social justice	Equitable distribution of adaptation investment and priority protection for vulnerable communities and places (City of Seattle, 2018; Bulkeley & Betsill, 2005).
	Collaboration & participation	Institutionalized stakeholder and public participation in defining, locating, and implementing adaptation measures (Nalau et al., 2018; Bulkeley & Betsill, 2005).
Sustainable Urban Systems	Transportation	Resilient and low-carbon mobility networks, including the spatial coordination of public transport and active travel (Liverpool City Council, 2022; Hurlimann et al., 2021).
	Tourism	Land-use and design measures that reduce tourism-related climate exposure while protecting local economies and ecological assets (IPCC, 2022).
	Energy	Spatial provision for renewable or decentralized energy infrastructure and energy-efficient urban form (Liverpool City Council, 2020).
	Water resources	Blue-green infrastructure, watershed protection, sustainable drainage, and water-security provisions embedded in plans (City of Rotterdam, 2013; Carter et al., 2015).
	Agriculture & food	Protection of agricultural land and food systems from sprawl, drought, flooding, and other climate pressures through land-use controls (IPCC, 2022).
	Industry	Resilience measures and spatial controls for industrial areas, infrastructure, and vulnerable or emission-intensive activities (City of Rotterdam, 2013).
	Employment	Anticipation of spatial changes in employment and economic activity associated with climate adaptation and a just transition (Liverpool City Council, 2020; City of Seattle, 2022).

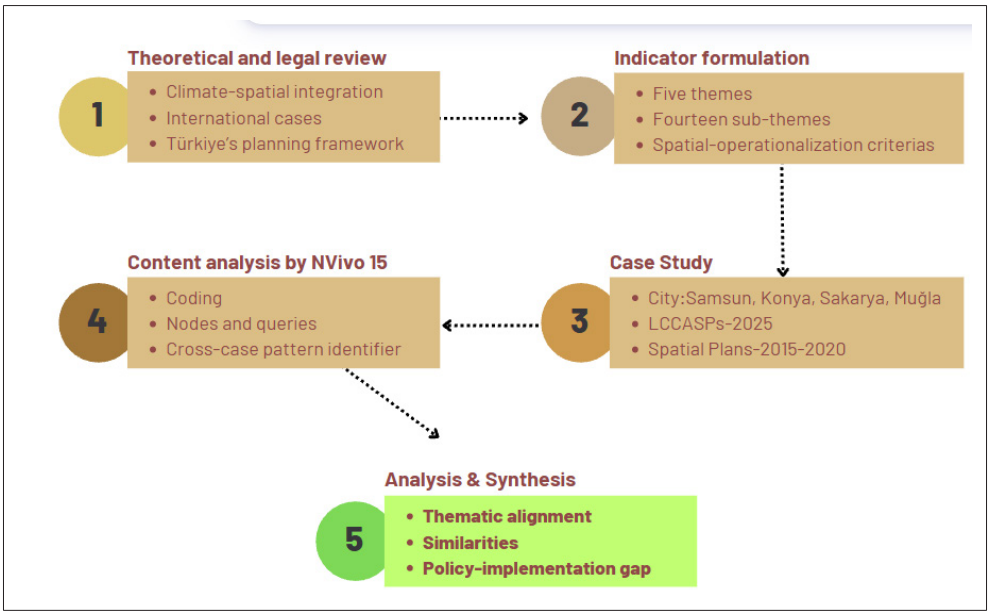


Figure 1. Research design and analytical workflow.

logical conditions and statutory planning systems. The research proceeded through six linked stages: (1) theoretical and legal review; (2) indicator formulation; (3) case and document selection; (4) directed qualitative content analysis of the LCCASPs in NVivo 15; (5) contextual qualitative analysis of the corresponding statutory spatial plans; and (6) cross-case synthesis. Figure 1 summarizes this workflow and clarifies the relationship between research design, data sources, and analytical techniques (Figure 1).

Case Study and Spatial Planning Context

The 2025 national pilot programme produced formal LCCASPs for Konya, Muğla, Sakarya, and Samsun (Figure 2). These metropolitan municipalities were selected as a complete pilot set rather than as a statistically representative sample. Their contrasting climatic, geographic, demographic, and economic characteristics provide a useful basis for comparative analysis.

Türkiye encompasses diverse climatic conditions, and the four cases represent inland semi-arid, Mediterranean coast-

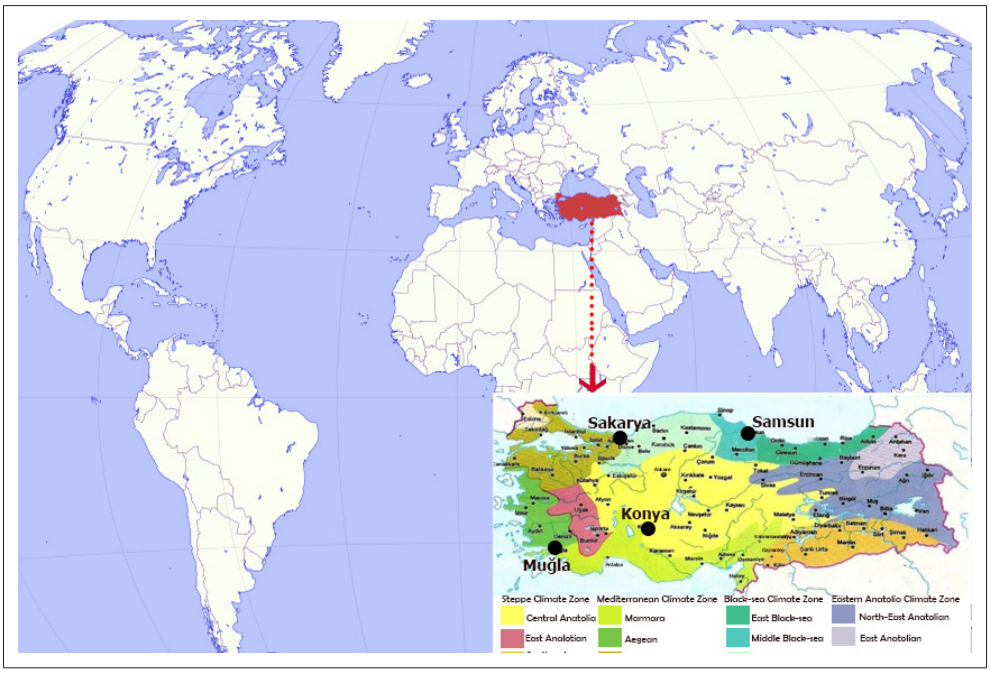


Figure 2. Location of Türkiye and case cities (Mızrak, 1983; Kazancı ve Tezer, 2023).

al, Marmara basin, and Black Sea coastal contexts (Mızrak, 1983; Peel et al., 2007). Their different hazard profiles and development pressures make it possible to examine whether a common national adaptation-planning framework is differentiated according to place-specific spatial conditions.

The cases therefore provide a comparative spectrum of socio-ecological conditions and spatial planning challenges rather than four interchangeable examples.

Because the LCCASPs were completed in 2025 while the principal statutory plans examined were enacted between 2015 and 2018, the statutory plans are treated as a pre-existing baseline. Table 2 juxtaposes the population, socio-ecological profile, climate vulnerabilities, adaptation priorities, and statutory spatial planning focus of each case. This temporal framing prevents causal claims and enables the study to identify the areas in which future plan revisions would need to operationalize the new adaptation priorities.

Although the four LCCASPs share a broadly comparable structure, their relevance to spatial planning depends on the distinct statutory priorities and development pressures of each case. The following summaries clarify the contextual basis used to interpret the NVivo results.

In Sakarya, the LCCASP prioritizes blue infrastructure, sustainable urban drainage, and land management in response to riverine flooding and extreme precipitation. The statutory spatial framework simultaneously addresses the protection of Sapanca Lake, agricultural land, and active fault zones while accommodating industrial development. The case therefore illustrates the challenge of connecting climate adaptation to basin protection, risk-sensitive growth, and industrial land-use decisions (MEU, 2015; MEUCC, 2025).

Muğla's LCCASP adopts a risk-governance approach and groups actions as policy and capacity measures, technological interventions, and nature-based solutions. Its Mediterranean coastal setting creates a combined exposure to forest fire, extreme heat, coastal hazards, and intense tourism-related development pressure. The statutory spatial framework emphasizes ecological protection and the management of tourism growth, providing a critical context for evaluating whether adaptation priorities can be translated into conservation, settlement, and design provisions (MBB, 2016; MEUCC, 2025).

Samsun combines regional logistics and agro-industrial functions with the ecological sensitivity of the Bafra and Çarşamba delta plains. Its statutory spatial framework addresses delta and agricultural-land protection, water basins, waste systems, and multimodal transport, while the LCCASP emphasizes green urbanization, local food security, and protection from flash floods and coastal storms. The case highlights the need to coordinate economic-corridor development with flood, coastal, and agricultural-land resilience (MEU, 2017; MEUCC, 2025).

Table 2. Population, socio-ecological characteristics, climate priorities, and statutory spatial planning context of the case municipalities

City	Population (TÜİK, 2025)	Socio-Ecological Profile & Main Economic Base (MEUCC, 2025)	Primary Climate Vulnerabilities (MEUCC, 2025)	LCCASP Focus (2025)	Statutory Macro-Scale Spatial Plan Focus
Konya	2.343.409	Inland semi-arid plateau Türkiye's primary agricultural hub and an expanding industrial center	Severe agricultural drought, water scarcity, heatwaves.	Agriculture, food security, drought resilience, and groundwater regulation.	Focuses on agricultural preservation and water management via the Konya Plain Project (KOP), while simultaneously establishing new logistics and industrial zones.
Muğla	1.099.547	Mediterranean coastal region; heavily reliant on seasonal tourism and rich in forest ecosystems.	Forest fires, sea-level rise, coastal erosion, extreme heat.	Risk-governance, resilient recovery, nature-based solutions, capacity building.	Aims to control tourism-driven rapid urbanization and protect ecologically sensitive areas through strict conservation zones.
Sakarya	1.123.693	Marmara river-basin context; a mixed economy of heavy industry and fertile agriculture.	Riverine flooding, extreme precipitation, urban heat islands.	Sustainable urban drainage, blue infrastructure expansion, land management.	Emphasizes protecting agricultural land, critical water basins like Sapanca Lake, and managing active fault lines.
Samsun	1.392.403	Black Sea coastal topography; a regional logistics and trade center with major agricultural delta plains.	Flash floods, landslides, coastal storms.	Green urbanization, hazard protection, local food security, institutional coordination.	Envisions the city as a macro-regional center for trade and agro-industry, prioritizing the absolute protection of delta plains from sprawl.

Konya's inland semi-arid geography produces a different planning context. The LCCASP emphasizes drought resilience, sustainable water supply, food security, and groundwater regulation, while the statutory spatial framework seeks to protect agricultural land and manage water resources alongside major industrial and logistics development. The case therefore tests whether climate and water constraints are reflected in long-term growth and land-allocation priorities (KMM, 2018; MEUCC, 2025).

These macro-scale statutory plans establish the principal conservation and development framework for the cases. Their comparison with the 2025 LCCASPs provides a baseline for identifying the spatial provisions, plan revisions, and lower-scale implementation instruments that would be required for climate priorities to affect future development decisions.

Analytical Method: Contextual Document and Content Analysis

The study combines two complementary qualitative techniques within a single comparative design. First, directed qualitative content analysis was used to identify and compare adaptation priorities in the four LCCASPs. NVivo 15 was selected for systematic data management, hierarchical coding, matrix queries, and cross-case comparison (Creswell & Poth, 2016; Santo-Tomás Muro et al., 2022). Second, contextual qualitative document analysis was applied to the corresponding statutory spatial plans to identify the land-use priorities, plan provisions, and legal-administrative conditions relevant to the coded adaptation themes. This is a multi-source qualitative design rather than a mixed-methods design because both components rely on qualitative documentary evidence.

The coding framework was derived from the conceptual synthesis and the indicators defined in Table 1. Four LCCASPs were imported into NVivo and coded through the following stages:

i. Initial coding: Relevant text was coded using the predefined indicators while allowing case-specific content to be recorded in analytical memos.

ii. Code structuring: Codes were organized as hierarchical nodes corresponding to the five themes and fourteen sub-themes.

iii. Matrix queries: NVivo matrix-coding queries were used to compare the presence, density, and co-occurrence of themes across the four cases.

iv. Comparative visualization: Cross-case relationships and thematic concentrations were visualized to support interpretation; visual outputs were treated as descriptive aids rather than independent evidence.

The statutory plans were not coded as if they were climate action plans. Instead, they were examined through a structured document-review matrix based on the same operational criteria: spatial representation, land-use provisions, design or development controls, infrastructure priorities, implementation responsibilities, and institutional coordination. The integration assessment was then produced by triangulating the NVivo findings with the case-context table and the statutory-plan review (Sembiring et al., 2025). This procedure improves transparency and reproducibility while avoiding the assumption that thematic frequency alone demonstrates spatial integration.

FINDINGS

The LCCASPs were coded through five themes and fourteen child codes (Figure 3).

Figure 3 maps the relationships between the four LCCASPs and the five principal indicator groups: risk assessment, strategic visioning, spatial and design-based adaptation, social resilience, and sustainable urban systems. The network visualizes thematic associations and supports cross-case comparison; it does not, by itself, demonstrate legal or spatial integration.

- Risk Assessments
- Strategic Visioning
- Spatial & Design-Based Adaptation
- Social Resilience
- Sustainable Urban Systems

The network indicates that the four plans contain multiple context-sensitive adaptation themes. However, comparison with the statutory-plan baseline identifies limited explicit correspondence between these themes and binding spatial provisions. The thematic density in Figure 3 is therefore interpreted as evidence of policy attention, whereas integration requires additional evidence in mapped decisions, plan provisions, development controls, or implementation mechanisms.

The codes were examined systematically within each LCCASP. Under spatial and design-based adaptation, for example, spatial representation is concentrated mainly in risk-assessment sections and generally takes the form of maps describing existing conditions. Strategic objectives and actions rarely extend this spatial evidence into plan amendments, mapped intervention zones, or enforceable development standards. This pattern is consistent with the interpretation that the LCCASPs function primarily as strategic guidance within the documentary period examined. Climate-adaptive design is likewise expressed mainly through proposals to prepare future guidelines, particularly for transport, tourism, green infrastructure, and the built environment.

Word-cloud visualizations summarize term frequencies in the four LCCASPs and support the identification of domi-

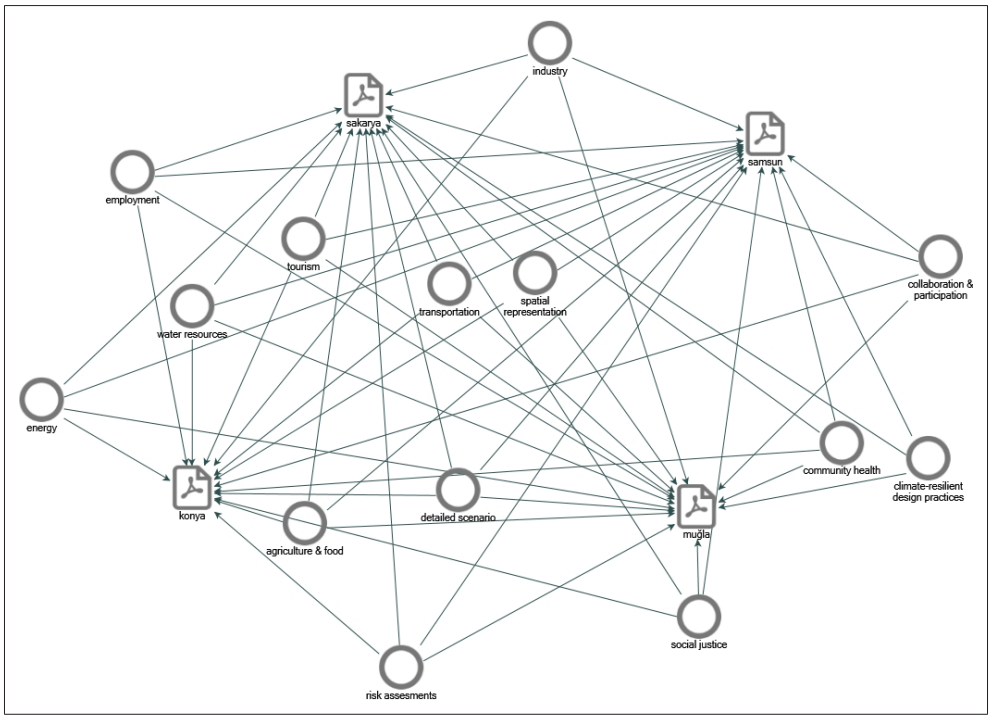
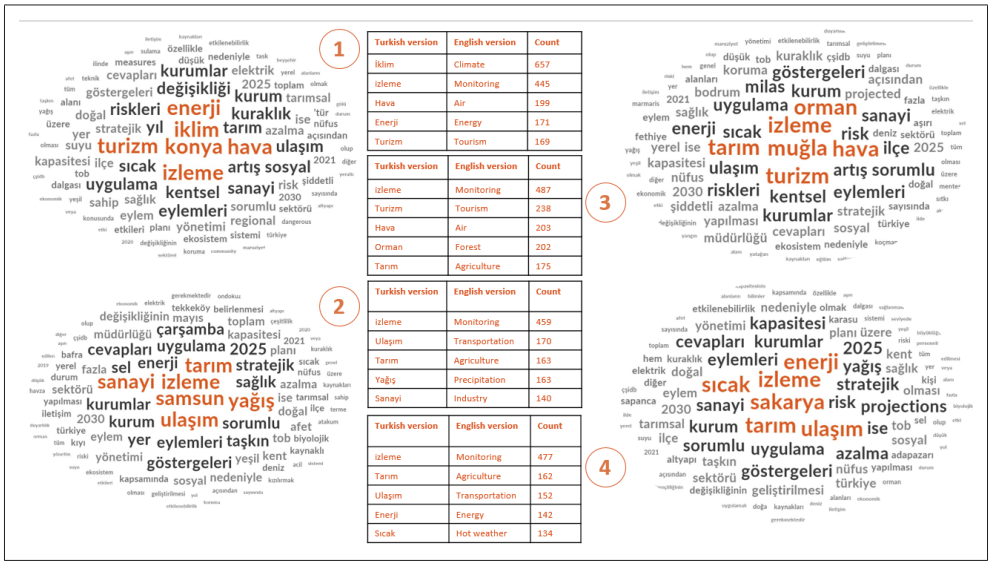


Figure 3. Relational mapping of climate adaptation priorities.

nant concepts (Figure 4). They are used as descriptive supplements to the coded analysis rather than as evidence of integration.

The word clouds reveal a shared vocabulary—particularly risk, climate, adaptation, monitoring, and implementation—alongside differences in sectoral emphasis. This standardized language coexists with the contrasting socio-ecological contexts summarized in Table 2. Themes such as water management in Konya, ecosystem protection in Muğla, drainage in Sakarya, and food or delta resilience in Samsun correspond to local vulnerabilities; however, the document comparison identifies limited explicit translation of these priorities into the pre-existing statutory spatial framework (Figure 4).

Differences in thematic distribution may reflect variations in local context, institutional experience, available evidence, and plan-preparation processes. Because these factors were not independently measured through interviews or organizational data, they are treated as plausible explanatory conditions rather than demonstrated causes. The results nev-



Turkish version	English version	Count
İklim	Climate	657
izleme	Monitoring	445
Hava	Air	199
Enerji	Energy	171
Turizm	Tourism	169

Turkish version	English version	Count
izleme	Monitoring	487
Turizm	Tourism	238
Hava	Air	203
Orman	Forest	202
Tarım	Agriculture	175

Turkish version	English version	Count
izleme	Monitoring	459
Ulaşım	Transportation	170
Tarım	Agriculture	163
Yağış	Precipitation	163
Sanayi	Industry	140

Turkish version	English version	Count
izleme	Monitoring	477
Tarım	Agriculture	162
Ulaşım	Transportation	152
Enerji	Energy	142
Sıcak	Hot weather	134

Figure 4. Word-cloud frequency visualizations for the four local climate adaptation plans.

ertheless show that place-based differentiation is necessary if a common national planning framework is to respond to distinct climate and spatial-development challenges.

Across the four cases, social justice, participation, monitoring, and institutional coordination are often expressed through similar formulations. This uniformity may indicate the influence of a common programme or planning template, but the documentary evidence does not establish the direction of policy transfer. More importantly, the statutory-plan comparison shows that frequently mentioned coordination objectives are not yet accompanied by clearly specified spatial-planning procedures, plan-revision triggers, or enforceable implementation responsibilities.

DISCUSSION AND CONCLUSION

This study assessed whether the thematic priorities of four 2025 LCCASPs are reflected in the existing statutory spatial planning framework. The results identify substantial attention to climate risks, strategic objectives, and sectoral actions within the adaptation plans, but limited explicit correspondence with mapped land-use decisions, binding plan provisions, or development controls in the older statutory plans. The central finding is therefore a baseline integration gap between strategic adaptation intent and spatial operationalization.

The LCCASPs share a broadly similar structure but differ in the emphasis placed on water, ecosystems, agriculture, tourism, transport, and other locally relevant systems. Some concepts—notably social resilience, participation, and employment—are repeated across the cases without always being connected to measurable spatial outcomes, green-economy transitions, or implementation responsibilities. This suggests that thematic completeness should not be treated as equivalent to context-sensitive or operational planning.

The comparison also clarifies the significance of temporal order. The statutory plans examined were enacted before the 2025 LCCASPs and therefore could not have incorporated those documents directly. The absence of correspondence should consequently be interpreted as evidence of the pre-existing planning baseline and of the scale of future integration required, rather than as proof that the new adaptation plans have already failed to influence subsequent plan revisions.

Two limitations should be noted. First, the study evaluates documentary alignment rather than implementation outcomes; interviews, institutional records, and project-level evidence would be required to test causal explanations concerning governance capacity or implementation performance. Second, the analysis captures a transitional legal moment: the statutory plans predate the 2025 LCCASPs, while Climate Law No. 7552 had only recently entered into force. Longitudinal research should therefore examine subsequent plan revisions and implementation decisions.

Climate Law No. 7552 introduces a new legal context by requiring climate strategies to be considered in public policy documents, establishing provincial coordination structures, and mandating local climate action plans. The Law strengthens the formal basis for integration, but the translation of climate priorities into spatial-plan designations, plan notes, development controls, financing, and monitoring procedures will depend on secondary regulation and implementation practice. Future statutory-plan revisions provide an important test of whether this emerging framework can close the documentary gap identified here.

The findings support three priorities for practice: a formal procedure linking LCCASP risk assessments to statutory-plan preparation and revision; spatial standards for converting risks and adaptation actions into mapped zones, plan provisions, and design requirements; and institutional arrangements that assign responsibilities, data-sharing protocols, monitoring indicators, and implementation resources. These mechanisms are necessary to move from thematic recognition to spatially accountable adaptation.

In conclusion, the four LCCASPs demonstrate increasing awareness of climate risk and provide a substantive strategic foundation for local adaptation. Their relationship with the existing statutory spatial framework remains limited, but the emerging legal context creates an opportunity for stronger integration. Realizing that opportunity will require explicit spatial-operationalization mechanisms and future empirical evaluation of how the new climate-planning obligations affect plan revisions and development decisions.

PEER-REVIEW: Externally peer-reviewed.

CONFLICT OF INTEREST: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

FINANCIAL DISCLOSURE: The authors declared that this study has received no financial support.

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