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Assessing Forest Legislation in the Context of Climate Change Through Expert and Practitioner Perspectives: The Case of the Turkish Forest Law

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Abstract

Forest law shapes protection, carbon sequestration, and adaptation. However, empirical and field-based evaluation of the mitigation and adaptation performance of forest legislation in combating climate change remains limited. This study combines legal analysis, the Analytic Hierarchy Process (AHP), and field data to assess Türkiye's forest law under seven criteria. The criteria were derived from five sources, validated by nine experts, and weighted through AHP. The perceived climate-related performance was assessed using a five-point Likert scale administered to 65 forestry practitioners for each article group. The Weighted Climate Score (WCS) was calculated as the product of dimension weights and item scores. Practitioners rated the overall contribution of the evaluated provisions significantly above the scale midpoint (WCS = 3.33/5). Conservation-oriented provisions received significantly higher scores than permit- and allocation-oriented provisions, and practitioners rated the mitigation contribution higher than the adaptation contribution. The main gaps were permit and allocation provisions and the absence of explicit carbon/climate language.

Keywords: forest governance; climate policy; analytic hierarchy process; content validity; forest conservation; environmental legislation

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1. Introduction

Forests are in a bidirectional relationship with the climate system: on the one hand, they contribute to mitigation by sequestering atmospheric carbon; on the other, through functions ranging from regulating the water regime to controlling erosion, they form part of adaptation infrastructure. The continuity of these two functions depends largely on the legal framework; the degree to which forest conservation, use, and allocation regimes are established with climate sensitivity is the degree to which these functions are guaranteed [1]. The reverse of this relationship is constituted by deforestation and forest degradation. These processes, through direct carbon emissions and loss of carbon sequestration capacity, exacerbate climate change by increasing the accumulation of CO_2 in the atmosphere [2,3]. Combating climate change is addressed through two fundamental and complementary approaches: mitigation and adaptation. Achieving sustainable outcomes depends on implementing both approaches together [4,5]. Mitigation concerns reducing sources of greenhouse gas emissions and/or enhancing sinks. Adaptation, on the other hand, refers to the process of making adjustments in human and natural systems in response to actual

or expected climate impacts [4]. These two axes have been institutionalized with the Paris Agreement [6]. Therefore, reducing emission sources and increasing sink capacity are addressed under the mitigation axis, while the adjustment of socioeconomic and ecological systems in the face of current and expected impacts is considered under adaptation. Modern forestry policies now approach forests not merely as areas focused on timber production, but as multifunctional systems that collectively provide carbon storage, ecosystem resilience, climate change adaptation, and other ecosystem services [7–9].

At the international level, the relationship between forest and climate policy has essentially been examined in the context of policy integration and coherence. Achieving policy integration across distinct sectors such as forestry, agriculture, climate and energy is defined as a fundamental governance challenge [10]. Research conducted specifically on the European Union has demonstrated that biodiversity conservation, ensuring the legality of the timber trade, and climate protection have contributed to the gradual development of the EU's environmental forest policy [11]. At the national level, an analysis of the consistency between climate change adaptation policies and forest policies in Nepal has been carried out; it was found that these policies are more consistent in terms of their objectives and measures than their implementing regulations. [12]. The literature on forest management also emphasizes that the adaptation process requires climate-related information to be incorporated into management decisions [13], and in European assessments, mitigation and adaptation efforts focusing on forests are addressed together [14].

In the literature, there are studies that focus directly on the legal regulations shaping the tendency of climate policies in this direction. Karal & Gençay [15] discussed the relationship between deforestation and global climate change from a legal standpoint. Kılıç Hernández [16] examined the legal nature of forest carbon and its relation to the carbon market at the doctoral level, taking the forest law into account, and a recent study discussing ownership rights over forest carbon [17] has also been presented. Additionally, Gençay & Birben [9] evaluated forest legislation in Türkiye based on the climate-smart forestry criterion, focusing on the aspects of mitigation and adaptation. Nachmany et al. [18] presented a cross-country inventory and comparative assessment of national climate legislation; classifying the climate laws of 66 countries into thematic categories, they provided a qualitative evaluation of legal progress, subjecting some assessments to peer review. Aside from Elvan et al. [19], who assessed Turkish forest legislation within a structured scoring framework based on FAO criteria, Tulukcu Yıldızbaş & Elvan [20] addressed legislation regarding mining permits in forests and forest mining contracts using sustainability indicators and a participatory approach. There are also examples of evaluating the effectiveness of forest legislation's sanctions and relevant provisions from the perspective of practitioner stakeholders [21].

There are also examples of quantitatively evaluating the practical effects of policy instruments related to national forest legislation. In a study assessing the effects of restoration incentives under Chile's Native Forest Law on forest cover, the carbon gains from these effects were calculated [22]. One such interdisciplinary evaluation of the national forest law is by Rüegg et al. [23]. In this study, forest data, hydrological data, GIS, modeling, and statistical analyses were combined to develop a methodological framework for evaluating the law's impact. Therefore, it can be said that the study supports the principle that a scientific assessment is necessary to determine whether the ecosystem service prescribed by forest legislation is actually provided in practice.

There are also studies in which criterion weighting is conducted and divided among experts and stakeholder layers. In the study by Cammerino et al. [24], by having experts identify the set of criteria and attributes, stakeholders carried out Analytic Hierarchy Process (AHP) pairwise comparisons, thus determining criterion weights. The output is a

GIS function map in which the dominant function is assigned to each forest unit. In another study, experts prioritized environmental risks during the compliance with legislation process [25], in which compliance risks arising from legislation were subjected to AHP weighting based on expert judgment.

Previous studies have examined the relationship between forest legislation, deforestation, and climate change, as well as climate-smart forestry and the legal status of forest carbon [9,17,26]. Comparative studies have also evaluated national climate legislation across different countries [18]. Quantitative and multi-criteria decision-making methods, including AHP, have been widely applied in forestry, for example, to incorporate stakeholder preferences into regional forest planning [27], to select forest management models and support collaborative landscape-level planning [28], to map forest functions [24], and to assess forest fire danger potential in [29]. Methodologically, AHP converts expert pairwise comparisons into quantitative criterion weights [30], while the Content Validity Index (CVI) enables the content relevance of criteria and measurement instruments to be evaluated through expert judgments [31]. Therefore, the methodological contribution of the present study lies not in the individual use of these methods, but in integrating legal analysis, CVI, AHP, and practitioner assessments within a single provision-level framework. To determine the study's position within the literature, a structured literature search was conducted across multiple academic databases using groups of search terms aligned with the scope and main components of the study. Details are provided in Section 2.2 and Supplementary Material S1. Within the scope of this search, no study was identified that, within the same model at the provision level of a national forest law, evaluates both mitigation and adaptation, validates climate criteria through a CVI process involving an independent expert panel, weights the criteria using AHP, combines practitioners' provision scores with these weights, and produces a composite weighted climate score.

Conceptual and Legal Framework

The distinction between mitigation and adaptation, as the founding axis of international climate law, also provides the framework for legislative analysis [4,6]. The IPCC AR6 Working Group associates forest ecosystems with mitigation on issues such as the preservation of carbon stocks and improved forest management [32]. The Working Group II links these ecosystems to ecosystem resilience, biodiversity, water and soil conservation, and ecosystem-based adaptation functions [33]. They are also considered in terms of the adaptation of forest products and the production of food and fiber [34]. Article 5 of the Paris Agreement directly addresses the protection and enhancement of sinks, including forests. Article 7 regulates the strengthening of adaptive capacity and resilience, while Article 2 establishes the general temperature and climate response framework [6]. The REDD+ and Cancun decisions focus on reducing emissions from deforestation and forest degradation, preserving forest stocks, and sustainable forest management [35]. In the case of Türkiye, the Nationally Determined Contribution and Climate Law No. 7552 constitute the national policy and legal layer of the international framework [36,37]. These groups of sources, which form the basis of the climate criteria used in this study, indicate the scope of the legislative analysis.

The first element to consider when examining Forest Law No. 6831 from a climate perspective is the constitutional protection regime established under Article 169 of the Constitution, which stipulates that the ownership of state forests cannot be transferred and that these forests must be managed and operated by the state [38]. This constitutional protection regime provides a legal basis for considering the conservation of carbon stocks in state forests within the framework of the public interest and the state's constitutional obligation to protect forests [39,40]. The second element concerns the legal instruments

through which forest protection, conservation, and use are structured under Forest Law No. 6831. These include the inclusion of land in the forest regime (Art. 3), the classification of forests according to ownership and characteristics (Art. 4), prohibitions and controlled use (Arts. 14–15 and 19), protection forests (Arts. 23–24), national parks and protected areas (Art. 25), management based on forest management plans (Art. 26), afforestation and watershed rehabilitation (Arts. 57–61 and Additional Art. 12), afforestation incentives (Art. 63), and provisions concerning forest offenses and penalties (Arts. 91–114) [41]. By contrast, permits and allocations for non-forestry uses (Arts. 16–18) and provisions concerning exclusion from forest boundaries (Art. 2 and Additional Art. 16) constitute the utilization and allocation dimension of the Law. This distinction provides the legal basis for the conservation–allocation comparison employed in this study.

Under Forest Law No.6831, forest legislation is administered and enforced nationally by the Ministry of Agriculture and Forestry and the General Directorate of Forestry (OGM), and regionally and locally through regional forest directorates, forest enterprise directorates, and forest enterprise chiefdoms. Within the study area, these functions are carried out by the Istanbul Regional Directorate of Forestry and its subordinate units. Forest protection officers detect unlawful activities, prepare official records, secure evidence, and conduct seizure procedures; suspected offenses are referred to the public prosecutor, with police or gendarmerie assistance where necessary. Depending on the specific act, non-compliance may result in administrative sanctions, including fines, suspension of unlawful activities, removal of unauthorized structures, and seizure measures. Conduct constituting a forest offense, such as illegal cutting, occupation or clearing, unauthorized mining, or causing a forest fire, may also give rise to criminal liability, including imprisonment and judicial fines, as well as confiscation, compensation, and recovery of restoration costs [41,42]. Available records indicate how these rules operate in practice. Nationally, recorded forest offenses fell from 41,845 in 1988 to 8813 in 2015 and rose to 14,991 in 2025, with unlawful clearing and occupation of forest land accounting for 75.4% of offenses in 2025 [43]. In the Kanlıca Forest Enterprise Directorate in Istanbul, occupation and clearing made up 77.8% of he 2068 offenses recorded in 2012–2021, and 81% of surveyed residents named the low deterrence of penalties as the main cause of offenses [44]. Criminal liability is applied, as 420 of the 15,470 persons imprisoned for forest offenses in Türkiye in 2001–2020 were admitted in Istanbul province [45]. However, in 100 Istanbul case files on the illegal use of forest land (2001–2011), only 4% of convictions were executed, while 72% were suspended and 24% were converted to fines [42]. These figures reflect detection and recording effort as well as actual violations and cover only part of the Istanbul region. However, the present study does not measure actual compliance by forest users or society, or the consistency of enforcement; the WCS reflects practitioners' perceived climate-related contribution of the legal provisions rather than observed enforcement outcomes.

The aim of this study is to assess, at the provision level, the extent to which Forest Law No. 6831 supports climate change mitigation and adaptation by combining climate criteria validated and weighted by experts with the assessments of practitioners who apply the Law. Within this framework, the central research question is: To what extent is Forest Law No. 6831 compatible with mitigation and adaptation criteria derived from selected international and national climate reference sources, and how is this level of compatibility evaluated by experts and practitioners? The main hypothesis focuses on the extent to which the Law meets current climate needs. The sub-questions examine the item-based weighted climate scores, the mitigation–adaptation difference, the comparison of conservation and permit/allocation provisions, and the characteristics of the evaluators.

2. Materials and Methods

2.1. Research Design

The research is designed as a multi-stage mixed method that combines legal analysis with quantitative expert evaluation and field application. The criterion set derived from legal document analysis was validated and weighted by a nine-member expert panel using CVI and AHP, whereas a separate group of 65 practitioners assessed the perceived mitigation and adaptation contributions of the selected legal provisions using a five-point Likert-type scale. An exploratory sequential logic was followed, and a multi-stage mixed method design was adopted [46]. Decisions on prioritization, sequencing, points of integration, and synthesis in sequential mixed designs were considered within the framework of Ivankova et al. [47]. Within the qualitative scope, legal content analysis was performed, and synthesis was achieved in the fifth stage by combining statistical findings with legal findings. Thus, the process was carried out in five stages, structured so that quantitative and qualitative data collection techniques supported each other: (i) systematic derivation of climate criteria from reference sources; (ii) validation of the criterion set through a Content Validity Index; (iii) calculation of AHP criterion weights; (iv) screening of statutory provisions against the defined criteria and their scoring via a field survey; (v) analysis of results with statistical tests and synthesis with legal findings. The field study was conducted with forestry practitioners working mainly in the Istanbul region (Section 2.6).

2.2. Derivation of Climate Criteria from Reference Sources

The criteria were formed through a three-layered process. First, five groups of reference sources were selected (Table 1). The selection of these resource groups was based on criteria requiring them to be directly related to forest ecosystems and forestry policies, to reflect the current scientific and policy framework, and to be suitable for deriving functional criteria regarding mitigation and adaptation. Second, the convergence of forest–climate functions represented by the candidate criteria among source groups was evaluated.

Table 1. Reference source groups used for deriving the climate criteria.

Code	Reference Source Group
F1	IPCC AR6 WG III Chapter 7 (AFOLU) [32]
F2	IPCC AR6 WG II Chapters 2 and 5 [33,34]
F3	Articles 5 and 7 of the Paris Agreement [6]
F4	REDD+ framework under Decision 1/CP.16 (paragraph 70 activities and Supplementary Material S1 safeguards) [35]
F5	Türkiye's 2023 NDC and Climate Law No. 7552 [36,37]

Criteria that were explicitly or functionally represented in at least three sources were directly included; those represented in two sources were subjected to expert validation. Candidates appearing in only one source were excluded. Third, the criterion set was finalized by a panel of nine (9) experts(Section 2.4).

In the study, seven (7) criteria have been identified demonstrating the distribution of the climate functions of forestry in terms of mitigation and adaptation. Under mitigation, there are three criteria: carbon sequestration and sink areas (K1), prevention of deforestation (K2), and afforestation–rehabilitation (K3); under adaptation, there are ecosystem resilience and biodiversity (K4), water and soil conservation (K5), fire management (K6), and sustainable forest management (K7). Determination of the criteria was achieved by synthesizing forest–climate functions recurring and represented in functionally equivalent ways in the selected groups of sources and by operationalizing them specifically for this study.

There is a special case for the fire management criterion. As this criterion was explicitly present in only two of the five source groups, it was included in the study on the basis of expert approval. Given Türkiye's Mediterranean fire regime, it was unanimously added to the set of criteria, thus establishing a set that reflects both the common ground of international documents and the country-specific climate risk.

To understand the position of the study in the literature, four conceptual blocks were queried in different combinations across Web of Science Core Collection, Google Scholar, YÖK National Thesis Center, and ProQuest Dissertation & Thesis Global databases: (i) forest law/forest legislation/national forest law; (ii) climate change/mitigation/adaptation/carbon; (iii) assessment/evaluation/scoring/index/provision-level legal analysis; and (iv) AHP/CVI/Likert/survey/practitioner/stakeholder/weighted-composite score. Searches were gradually narrowed down from broad forest law–climate queries to the methodological structure specific to the study. Forward citations for close precedents were also checked in WoS. In ProQuest, the NOFT (Anywhere except full text) field code was used to reduce incidental matches within full texts. The full search strings, result numbers, screening decisions, and how the originality threshold was narrowed are presented in Supplementary Material S1.

2.3. Scanning of Legal Provisions and Matching with Criteria

Forest Law No. 6831 has been taken as the legal basis. Articles 1 to 116 of the Law, including supplementary and provisional articles, were reviewed [41]. For each article, the following question was posed: Is this article directly or indirectly related to climate change mitigation and adaptation? The articles found to be relevant were matched with the criteria (K1–K7) they serve or pose risk to. Then, the type of relationship was classified as direct/deterrent. The relationship was classified as direct when a provision itself regulated an activity affecting a climate criterion, such as forest protection, afforestation, or allocation, and as deterrent when it supported the criterion indirectly by prohibiting or sanctioning activities that could cause forest loss or degradation. The initial screening of legal provisions and the matching of provisions to criteria were carried out by the first author. Subsequently, the second author reviewed the screening and matching decisions on an item-by-item basis. Any discrepancies regarding the inclusion of a provision, its matching with a criterion, or the classification of the relationship were discussed by the two authors and resolved through consensus. With this matching, a framework was established for how field law practitioners would evaluate the articles from a climate perspective.

The presence of the words "climate" or "carbon" was not taken as a prerequisite in the review. Instead, the basis was whether the relevant provision supports the legal function or produces risk regarding these criteria. Prior to the field survey, the provision–criteria matching was completed and presented to the participants. Thus, an analytical foundation was established for the article groups. Following this screening and matching process, the climate-related provisions included in the field survey were organized into 17 provision groups. These provision groups and the corresponding articles of Forest Law No. 6831 are presented in Table 2.

Table 2. Provision groups of Forest Law No. 6831 evaluated in the practitioner survey.

Provision Group	Article
Protection forests	Article 23–24
Afforestation	57–61, Add. Article 12
Crimes and penalties	Article 91–114
Fire prevention/extinguishing	Article 68–76
Prohibitions and controlled use	Article 14–15, 19
Forest management planning & production	Article 26

Table 2. *Cont.*

Provision Group	Article
General Directorate of Forestry duties and powers	Article 6
National parks and protected areas	Article 25
Inclusion into forest regime	Article 3
Afforestation incentives	Article 63
Definition of forest	Article 1
Classification of forests	Article 4
Permits and allocations (mining)	Article 16
Forest villages	Article 13, 31–32
Prohibition of clearing for agriculture/settlement	Article 17
Special-status permits	Article 18
Exclusion from forest boundaries	Article 2, Add. Article 16

2.4. Criterion Validation with Content Validity Index (CVI)

The Content Validity Index calculation was performed to test the extent to which the criteria represent the climate function of forest legislation. Validation was carried out by following the six-step 6C model [31], then it was administered to a panel of nine (9) experts.

The inclusion criteria for the expert panel were having a doctoral level graduate education in forestry or a related field and at least two scientific publications in the field of climate change. The panel was formed to cover sub-specializations including ecology, soil and water conservation, carbon management, forestry policy and economics, forest law, watershed management, and forest resources planning. The panel comprised eight academics from faculties of forestry at five universities and one expert from the General Directorate of Forestry. Seven held the title of professor, one was an associate professor and one held a doctorate; their professional experience ranged from 15 to 38 years (mean 29 years). The same nine experts completed both the CVI and AHP stages and to preserve the anonymity assured to them, are described here in aggregate.

Experts evaluated each criterion on a 4-point scale. Scores of 3 and 4 were coded as valid/relevant (1), while scores of 1 and 2 were coded as invalid/not relevant (0). The item-level Content Validity Index (I-CVI), scale-level average index (S-CVI/Ave), and universal agreement index (S-CVI/UA) were calculated according to the approach of Polit and Beck [48]. For a criterion to be considered valid in the nine-expert panel, the I-CVI $\geq$ 0.78 threshold was used [48,49]. The K6 Fire Management criterion was subjected to the same CVI validation procedure as the other six criteria. The only distinction for K6 was that its inclusion in the final set of criteria was contingent upon additional expert validation, as it was explicitly represented in only two of the five reference source groups. Following unanimous validation by the experts, K6 was incorporated into the final seven-criterion set and evaluated within the same hierarchical structure alongside the other criteria during the subsequent AHP phase. No separate analysis was conducted for K6.

2.5. AHP Method and Pairwise Comparison

The Analytic Hierarchy Process (AHP) is a multi-criteria decision-making method that converts the relative importance of criteria into numerical weights through pairwise comparisons. In this study, since it was assumed that the seven climatic criteria did not possess equal importance, AHP was employed to weight expert opinions and assess their consistency.

For weighting the criteria determined by the Analytic Hierarchy Process, a 1–9 importance scale was used [30]. The criteria were subsequently reported under the dimensions of mitigation and adaptation, and in the AHP phase, all seven criteria were compared within a single hierarchical framework. Thus, each expert made a total of 21 pairwise compar-

isons. The matrices from the nine experts were aggregated cell by cell using the geometric mean to form the group decision matrix. The relative importance weights of the criteria were obtained from the normalized eigenvector corresponding to the largest eigenvalue. Consistency was measured using the CR = CI/RI formula. For N = 7, RI = 1.32 was used, and CR < 0.10 was taken as the acceptable consistency threshold [30]. The same threshold has also been adopted in recent multi-criteria decision analysis applications [50]. AHP has also been applied in forestry and environmental decision-making contexts, including forest-function assessment and environmental compliance risk prioritization [24,25].

2.6. Likert-Type Field Survey

To assess practitioners' perceptions of the climate-related contribution of the legal provisions, data were collected through a five-point Likert-type survey. The survey was administered both face-to-face and online to managers, chiefs, engineers, and expert staff working in the central and provincial units of the Istanbul Regional Directorate of Forestry (OGM), the Regional Directorate of Nature Conservation and National Parks (DKMP), and relevant research institutes, as well as to forestry professionals working in the private sector or formerly employed in these institutions. In this study, the Istanbul region refers to the area served by these two regional units and does not correspond to a single province or a statistical region. The Istanbul Regional Directorate of Forestry covers Istanbul province, the Thrace provinces of Kırklareli and Tekirdağ, and part of Edirne [51], whereas the Regional Directorate of Nature Conservation and National Parks (1st Regional Directorate), also based in Istanbul, additionally covers Kocaeli and Sakarya [52]. Participants from research institutes and the private sector also worked in this area. The target group consisted of professionals holding a bachelor's degree or higher who worked, or had worked, in positions relevant to the subject of the study. The survey invitation was distributed to all personnel meeting these eligibility criteria, and participation was voluntary. A total of 65 valid responses were obtained. A sensitivity analysis in G *Power 3.1.9.7 (Heinrich Heine University Düsseldorf, Düsseldorf, Germany) [53] showed that with 65 participants, one sample *t*-test had 80% power to detect an effect of d = 0.31. The observed effect in the main test (d = 0.58) exceeded this threshold.

The survey was conducted between 15 May 2026 and July 2026 and consisted of three sections: (i) professional and demographic characteristics (organizational unit, professional experience, level of education, training or certification in climate-related matters, and the respondent's self-assessed level of climate knowledge); (ii) the 17 regulatory groups (34 provisions) listed in Table 2, each of which was assessed separately in terms of its contribution to both mitigation and adaptation processes; and (iii) a general question regarding the extent to which the Act meets current climate needs.

Participants rated the perceived contribution of each provision group to climate change mitigation and adaptation on a scale ranging from 1 (none) to 5 (very high). The sample was institution-based and geographically limited mainly to the Istanbul region; therefore, it should not be regarded as statistically representative of all forestry practitioners in Türkiye. Moreover, the Likert scores reflect practitioners' perceptions of the climate compatibility and legal contribution of the provisions rather than their demonstrated climate or environmental outcomes. Accordingly, the findings should be interpreted within the institutional and geographical boundaries of the sample.

The full questionnaire is provided in Supplementary Material S2.

2.7. Weighted Climate Score (WCS) Calculation

For each article group, the WCS combined the field scores with the AHP weights. In the AHP stage, all seven criteria were compared in one hierarchy and received criterion-level

weights: mitigation comprised K1, carbon sequestration/sink areas (0.128835); K2, prevention of deforestation (0.296222); and K3, afforestation–rehabilitation (0.095196). Adaptation comprised K4, ecosystem resilience/biodiversity (0.088555); K5, water and soil conservation (0.106058); K6, fire management (0.115536); and K7, sustainable forest management (0.169598). Because the practitioner questionnaire elicited one mitigation score and one adaptation score for each provision group, rather than seven separate criterion scores, the criterion weights were aggregated within their predefined higher-order dimensions. Using the unrounded AHP values, K1 + K2 + K3 yielded the mitigation dimension weight of 0.520252, while K4 + K5 + K6 + K7 yielded the adaptation dimension weight of 0.479748. Accordingly, WCS = 0.520252 × L(mitigation) + 0.479748 × L(adaptation), where the L values are the mean contribution scores given by the 65 participants to the relevant provision group. This aggregation preserves the relative priority assigned to the seven criteria at dimension level, matches the two-dimensional structure of the field instrument, and keeps the final WCS on the original 1–5 response scale because the two-dimension weights sum to 1.000.

As a calculation example, for conservation forests (Articles 23–24), the mean mitigation score was 3.8769 and the mean adaptation score was 3.8462. Thus, WCS = (0.520252 × 3.8769) + (0.479748 × 3.8462) = 3.8622 (see Section 3.4). The criterion weights are not applied again separately at this stage because the field survey did not generate criterion-specific K1–K7 scores for each provision group.

Therefore, in this study, the WCS should not be interpreted as a direct measure of the actual environmental or climatic outcomes of the Law's provisions. Instead, it should be interpreted as an indicator that aggregates the practitioners' perceptions and assessments regarding the contribution of the Law's provisions to climate change mitigation and adaptation, within the framework of the dimension weights determined via AHP.

2.8. Statistical Analyses

Analyses were conducted using IBM SPSS Statistics 30 (IBM Corp., Armonk, NY, USA) and Microsoft Excel LTSC (version 16.0.14334.20918, 64-bit; Microsoft Corp., Redmond, WA, USA). Distributional assumptions were tested by the Shapiro–Wilk test, and since the weighted climate score at the participant level was found to be normally distributed ($p = 0.093$), the main hypothesis was operationalized as the comparison of the score with the scale midpoint (3.0), and tested using a one-sample *t*-test. The mitigation–adaptation comparison was determined by the Wilcoxon signed-rank test due to deviation from normality in the paired difference series.

The conservation-allocation comparison was also performed using the Wilcoxon test. Differences by demographic groups were examined using the Mann–Whitney U test for two-category variables and the Kruskal–Wallis H test for multi-category variables. In cases of significant results, the source of pairwise differences was determined by the Dunn test.

In the classification, due to the relatively low number of participants in some sub-units of the General Directorate of Forestry (OGM), and to reduce the instability that may arise from small cells and to make group comparisons more interpretable, the field units affiliated with OGM were combined under a single category. OGM units are responsible for the management, protection, and utilization of state forests under Forest Law No. 6831, whereas DKMP units are responsible mainly for national parks, protected areas, and wildlife. Thus, the analysis was repeated over four groups: OGM field units, DKMP, the Research Institute, and Others.

The relationship between professional experience and scores was examined using Spearman rank correlation. In inferential tests regarding practitioner evaluations, the unit of analysis was the participant-level scores; in questions comparing the 17 provision groups, it was the provision group-level paired scores.

3. Results

3.1. Validation of the Criteria (CVI)

All seven criteria met the content validity threshold (0.78; Table 3). The scale-level average index was found as S-CVI/Ave = 0.921, and the universal agreement index as S-CVI/UA = 0.429. The afforestation–rehabilitation (K3), water and soil conservation (K5), and fire management (K6) criteria received full scores; sustainable forest management (K7) received the lowest value with 0.778 and was the criterion where revision suggestions were concentrated. The unanimous validation of the fire criterion by experts confirmed its context-specific contribution to the set of criteria.

Table 3. Climate criteria and content validity indices (n = 9 experts).

Code	Criteria	Extent	I-CVI	Decision
C1	Carbon sequestration-sink areas	Mitigation	0.889	Valid
C2	Prevention of deforestation	Mitigation	0.889	Valid
C3	Afforestation–rehabilitation	Mitigation	1.000	Valid
C4	Ecosystem resilience/biodiversity	Adaptation	0.889	Valid
C5	Water and soil conservation	Adaptation	1.000	Valid
C6	Fire management	Adaptation	1.000	Valid
C7	Sustainable forest management	Adaptation	0.778	Valid

3.2. AHP Weights and Consistency

The consistency ratio of the group decision matrix remained well below the 0.10 threshold at CR = 0.0098; values hovering near the threshold at the individual level reached low group inconsistency due to the balancing of random deviations when combined via geometric mean. In the distribution of weights, prevention of deforestation (K2) received by far the highest weight at 29.62%; sustainable forest management (K7, 16.96%) ranked second, and carbon sequestration (K1, 12.88%) ranked third. Ecosystem resilience (K4) had the lowest weight at 8.86% (Table 4).

Table 4. AHP importance weights of the criteria (group, geometric mean).

Code	Criteria	Extent	Weight
C2	Prevention of deforestation	Mitigation	0.296222
C7	Sustainable forest management	Adaptation	0.169598
C1	Carbon sequestration-sink areas	Mitigation	0.128835
C6	Fire management	Adaptation	0.115536
C5	Water and soil conservation	Adaptation	0.106058
C3	Afforestation–rehabilitation	Mitigation	0.095196
C4	Ecosystem resilience/biodiversity	Adaptation	0.088555

Group consistency ratio CR = 0.0098. Dimension weights used in the WCS calculation were 0.520252 for mitigation and 0.479748 for adaptation.

3.3. Sample Profile and Scale Reliability

Of the sixty-five participants, 43.1% have 21 years or more of professional experience; in terms of educational level, 63.1% hold a bachelor's degree, 27.7% a master's, and 9.2% a doctorate. A total of 50.8% of the participants have attended a climate training or certificate program, and 60% assessed their climate knowledge as moderate. In terms of service unit distribution, the private sector/former employee group (29.2%), research institutes (18.5%), and the Directorate of Nature Conservation and National Parks (16.9%) stood out. The internal consistency of the scale is at a good level: the Cronbach's alpha coefficient was 0.826 for the mitigation scale, and 0.836 for the adaptation scale.

3.4. Item-Level Weighted Climate Scores

The weighted climate score for the Law overall is 3.33/5 (66.6%). Fourteen of the 17 article groups examined received a score of 3.00 or higher; three article groups (Art. 17, Art. 18, and Art. 2 with Additional Art. 16 regarding 2/B procedures) fell below 3.00. The picture is similar at the participant level: 92.3% (60/65) of participants have an individual weighted climate score above 3. The highest scores were received by the protection and restoration provisions; conservation forests (Art. 23–24: 3.86) and afforestation–watershed rehabilitation (Art. 57–61 and Additional Art. 12: 3.83) lead the rankings. The lowest scores are found in provisions on non-forestry use and allocation. Practitioners regard the Law's conservation core as strong in terms of climate, while seeing the permit and allocation regime as weak. The weighted climate scores for all 17 provision groups are presented in Table 5.

Table 5. Weighted Climate Scores (WCS) for groups of provisions of the Act [1].

Article Group	L (Mitigation)	L (Adaptation)	WCS
Protection forests (Art. 23–24)	3.88	3.85	3.86
Afforestation/Watershed management (Art. 57–61, Add. Art. 12)	3.85	3.80	3.83
Crimes and penalties (Art. 91–114)	3.80	3.51	3.67
Fire prevention/extinguishing (Art. 68–76)	3.69	3.62	3.66
Prohibitions and controlled use (Art. 14–15, 19)	3.60	3.60	3.60
Forest management planning & production (Art. 26)	3.46	3.37	3.42
General Directorate of Forestry duties and powers (Art. 6)	3.43	3.32	3.38
National parks and protected areas (Art. 25)	3.32	3.37	3.34
Inclusion into forest regime (Art. 3)	3.35	3.32	3.34
Afforestation incentives (Art. 63)	3.31	3.22	3.27
Definition of forest (Art. 1)	3.25	3.25	3.25
Classification of forests (Art. 4)	3.25	3.23	3.24
Permits and allocations (mining) (Art. 16)	3.26	3.08	3.18
Forest villages (Art. 13, 31–32)	3.08	3.00	3.04
Prohibition of clearing for agriculture/settlement (Art. 17)	2.94	2.83	2.89
Special-status permits (Art. 18)	2.89	2.83	2.86
Exclusion from forest boundaries (2/B) (Art. 2, Add. Art. 16)	2.98	2.63	2.83

[1] Overall WCS (all items) = 3.33/5. Dimension weights: mitigation, 0.520252; adaptation, 0.479748.

3.5. Hypothesis Tests

In the main hypothesis test, the participant-level mean weighted climate score (3.33 ± 0.57) is significantly above the scale midpoint of 3.00 (one-sample *t*-test; t(64) = 4.684; one-tailed $p < 0.001$). Accordingly, practitioners rated the general contribution of the evaluated provisions of the Law to climate change mitigation and adaptation as significantly above the midpoint of the scale. A significant difference was found between mitigation and adaptation contribution scores; the mitigation mean (3.37) is higher than the adaptation mean (3.28) (Wilcoxon W = 296.5; $p = 0.020$; rank-biserial r = 0.401, medium effect). The score for conservation-oriented provisions (mean 3.60; median 3.67) is significantly higher than that for permitting and allocation provisions (mean 2.98; median 3.00) (Wilcoxon Z = −3.979; $p < 0.001$).

On the expert assessment side, a different pattern is observed: there is no significant difference between mitigation and adaptation dimension weights calculated from the individual AHP vectors of the nine experts (mitigation median 0.567; adaptation median 0.433; Wilcoxon $n = 9$; W = 17; $p = 0.570$). Although the difference between the AHP-weighted scores and the simple means under the equal-weights assumption for the criteria is statistically significant (Wilcoxon $n = 17$; W = 4; $p = 0.002$), its absolute magnitude is very small. While this comparison derives from the same weight difference as the mitigation–

adaptation difference, it was conducted at a different unit of analysis: here, matching is at the level of 17 provision groups, whereas in the mitigation–adaptation test, it is at the level of 65 participants. No statistically significant association was detected between years of professional experience and the weighted climate score ($\rho = 0.027$; $p = 0.834$), the adaptation scale average ($\rho = 0.095$; $p = 0.449$), or the overall assessment of how well the Law meets climate needs ($\rho = 0.178$; $p = 0.156$). The results of all hypothesis tests are summarized in Table 6.

Table 6. Summary of hypothesis tests.

Research Hypothesis	Statistical Test and Results	Decision
Overall WCS > 3.0	$t(64) = 4.684$; $p < 0.001$	Supported (WCS significantly > 3.0)
Mitigation ≠ Adaptation contribution	$W = 296.5$; $p = 0.020$; $r = 0.401$	Significant difference (Mitigation > Adaptation)
Expert weight: Mitigation ≠ Adaptation	$W = 17$; $p = 0.570$	No significant difference
Protection > Permits/Allocations	$Z = -3.979$; $p < 0.001$	Protection is significantly higher
AHP-WCS ≠ Simple average	$W = 4$; $p = 0.002$	Significant difference (Paired test)
Experience ↔ Rating score	$\rho \approx 0.03$–0.18; $p > 0.15$	No significant association

3.6. Differentiation of Evaluations by Demographic Groups

Significant differences were found across both mitigation and adaptation dimensions based on the organizational unit (Kruskal–Wallis; mitigation: $\chi^2 = 22.57$, $p = 0.004$; adaptation: $\chi^2 = 16.88$, $p = 0.031$). Due to the low number of participants in certain OGM sub-units during the initial classification, OGM field units were consolidated into a single category, and the analysis was repeated across four groups: OGM field units ($n = 23$), DKMP ($n = 11$), Research Institute ($n = 12$), and Other ($n = 19$). The differences remained significant following this regrouping, with a large effect size observed for both mitigation ($H = 11.79$, $p = 0.008$, $\eta^2 = 0.144$) and adaptation ($H = 12.95$, $p = 0.005$, $\eta^2 = 0.163$). The Dunn pairwise comparison test revealed that the significant difference lay between OGM field units and DKMP personnel. While the median mitigation and adaptation scores for OGM field units were 3.65 and 3.53, respectively, the corresponding values for the DKMP group were 3.18 and 2.88. Thus, OGM field personnel rated the perceived contribution of the Law's provisions to mitigation and adaptation more highly than did DKMP personnel. Because the DKMP ($n = 11$) and research institute ($n = 12$) groups remained small after regrouping, these between-group differences should be regarded as exploratory. In contrast, no significant differences were found based on professional experience, education level, certification status, or level of knowledge regarding climate issues.

4. Discussion

4.1. Overall Assessment and the Conservation Core of the Law

The fact that the WCS lies above the midpoint of the scale indicates that practitioners perceive the assessed provisions of the Law as contributing positively, overall, to climate change mitigation and adaptation.

The latest global evidence shows that deforestation and forest degradation are predominantly linked to direct land-use pressures such as commercial agriculture, increased land allocation for livestock farming and timber harvesting, whilst economic, demographic and political factors act as the underlying drivers of these processes. In this context, the legal design of forest conservation regimes takes on particular importance in the fight against climate change [28].

Articles 1, 3, and 4, which regulate the definition, scope, and regime designation of forests, do not explicitly reference carbon sequestration or climate function; the justification for forest protection is based on timber production, erosion control, and biodiversity conservation [41].

Carbon storage remains a sub-element of the aim of nature conservation and is not regulated as an independent climate-related public benefit. The conservation forests regime (Arts. 23–24) exemplifies this contradiction: although inviolability in practice ensures continuity of carbon accumulation, carbon density is not used as a criterion when determining which forests should be prioritized for protection. The relatively higher ratings of conservation-oriented provisions are consistent with the forest–climate literature and the international climate framework, which treat the protection of existing forest carbon stocks, the prevention of deforestation, and sustainable forest management as core components of mitigation and adaptation [9,15,32,35]. The absence of carbon density as a prioritization criterion also parallels a concern raised in international forest policy, where rules that treat forest types equally regardless of their ecosystem integrity and risk of carbon loss have been argued to limit policy effectiveness [54].

There is formal protection at the article level; there is no functional, carbon-focused protection. Indeed, Additional Article 21, added to Law No. 6831 by Article 13 of Law No. 7584, has established a clear legal basis for carbon sink forests for the purpose of combating global climate change and increasing the greenhouse gas retention capacity of forests [55]. The regulation was published in the Official Gazette dated 20 June 2026 and numbered 33286. This amendment is a recent development that partially remedies the lack of explicit carbon/climate language identified in the study; however, the provisions added by Law No. 7584 were not included in the evaluation scope or the WCS calculation of this study. Other legal and policy frameworks link forest protection to climate objectives more directly. Article 5 of the Paris Agreement calls on parties to conserve and enhance sinks and reservoirs, including forests, and the REDD+ framework includes the conservation and enhancement of forest carbon stocks among its activities [6,35]. In the European Union, climate protection has become one of the key issues in the development of an environmental forest policy [11]. In Law No. 6831, by contrast, forest carbon has been protected mainly through public ownership, prohibitions, and sanctions, and explicit carbon language entered forest law only with Law No. 7584 [55].

4.2. Permit and Allocation Provisions

The lowest scores cluster in provisions regarding non-forestry uses and allocations: 2/B process (2.83), special-purpose permits (2.86), and the prohibition of land clearing (2.89). The fact that protection provisions scored significantly higher than permit/allocation provisions ($Z = -3.979$; $p < 0.001$) is consistent with the tension between the conservation and allocation provisions of the Law identified in the legal analysis. One participant from the expert panel qualitatively supported this finding by noting that non-forestry permits issued under Articles 16 and 17 lead to de facto deforestation. The lower ratings of permit- and allocation-oriented provisions are also consistent with earlier Türkiye-specific studies that examined mining permits and the non-forestry use of forest land from sustainability and legal perspectives [15,20].

Long-term forest area data provide context for these ratings. Türkiye's forest area increased from 20,199,296 ha (26.1% of the country) in 1973 to 22,933,000 ha (29.4%) in 2020 and 23,375,331 ha (%30) in 2025, an increase that the forest administration attributes mainly to afforestation and partly to changes in inventory techniques [43,56]. Istanbul shows a different trend: the province's forest area declined from 246,891 ha in the 1999–2002 inventory to 240,688 ha in 2020 [56], and the forest area under the Istanbul Regional Directorate of Forestry fell from 639,684 ha in 2020 to 626,979 ha in 2025 [43,56]. In both cases, the loss occurred in degraded forest (crown cover $\leq 10\%$), while productive forest (crown cover 11–100%) increased slightly [43,56]. These changes cannot be attributed to Forest Law No. 6831 alone, but the contrast between national gains and continued losses

in Istanbul is consistent with the low scores that practitioners assigned to permit and allocation provisions.

Conditioning permit and allocation provisions on climate safeguard criteria is the most concrete area for improvement in the Law. Law No. 7584, with Additional Article 21, also amended the Law's allocation regime on the same date. Additional Article 22, added by Article 14, allows existing deed registrations on immovables that have been designated as state forests according to the finalized forest Cadastre to be considered valid without payment, enables the removal of forest annotations in deed registers, and allows for the return of immovables with canceled deeds upon application within two years. Additional Article 23, added by Article 15, allows for renewed 2/B applications on areas with canceled title for reasons outside the explicitly stated justifications in the Law [55]. While Additional Article 21 introduces carbon sinks into the language of the Law, the same legislative package's Additional Articles 22 and 23 expand the scope of the provision group that scored lowest in this study. The simultaneity makes it clear that there is no necessary link between the inclusion of climate objectives in the Law's text and reduced legal pressure on carbon stocks.

4.3. Perceptual–Priority Tension Between Mitigation and Adaptation

The findings reveal an interesting tension. Implementers scored the mitigation dimension significantly higher than adaptation when evaluating article contributions ($W = 296.5$; $p = 0.020$), whereas experts did not generate a significant priority difference between the two dimensions in criteria weighting ($p = 0.570$). This divergence points to a gap between field-level perception and normative prioritization: in practice, the mitigation function is seen as more visible and measurable, while expert assessment positions mitigation and adaptation as equally weighted obligations in climate action. The high weight that experts assigned to the prevention of deforestation (K2) shapes this balance in favor of protecting existing resources.

How forestry professionals in Türkiye perceive climate change and which adaptation strategies they adopt has previously been examined [57]. The design here links the evaluation of the same occupational group not to a general attitude scale but to specific legal provisions; thus, it becomes possible to distinguish the areas in which perception is concentrated. The divergence between practitioner evaluations and expert priorities indicates that these two levels of assessment should be examined separately. Earlier studies have likewise treated expert-based weighting [24,25] and stakeholder or practitioner assessments [21,24,27] as distinct components of evaluation. Within the practitioner sample, OGM field personnel rated the provisions higher than DKMP personnel (Section 3.6). This difference may reflect institutional mandates, since OGM units apply Law No. 6831 directly in forest management, whereas DKMP units work mainly on protected areas and wildlife and may assess the Law from a stricter conservation standpoint. Given the small DKMP group ($n = 11$), this interpretation remains tentative.

4.4. Contribution, Limitations, and Future Research

The contribution of this study can be summarized in three points. First, it evaluates Forest Law No. 6831 [41] at the provision level in the same analytical framework in terms of both adaptation and mitigation. Second, it integrates legal content analysis with independent content validity confirmation, expert-based AHP weighting, and practitioner assessments. Third, by making visible which groups of provisions more strongly support climate goals and which ones are relatively weak, it provides an empirical basis for the compatibility discussion of Türkiye's evolving climate policy and net zero targets.

This study has four main limitations. First, the sample was institution-based, non-probabilistic, and drawn mainly from the Istanbul region; it therefore does not represent all forestry practitioners in Türkiye's. Second, the ratings may be affected by self-selection, institutional position, familiarity with the provisions, and social desirability; anonymous participation and separation of expert and practitioner roles were used to limit these effects, and the perception data are interpreted alongside official records on offenses, court outcomes and forest area. Third, the WCS reflects practitioners' assessments rather than actual environmental outcomes. Studies in other countries have measured the ecological effects of forest legislation using satellite, hydrological, and spatial data [22,23]. Fourth, the study covers only Forest Law No. 6831; secondary legislation and the amendments introduced by Law No. 7584 were excluded from the assessment. Future studies should use larger and regionally broader samples, examine other components of forest legislation, and combine practitioner assessments with biophysical and environmental outcome indicators.

5. Conclusions

This study presents an approach that combines legal analysis, expert opinions, and practitioner assessments to evaluate the relationship between Forest Law No. 6831 and climate change. The results indicate that conservation-oriented provisions are viewed more favorably than those regarding permits and allocations. However, these results do not directly reflect the Law's actual environmental impacts. The findings also suggest a need for the explicit inclusion of climate goals in forestry legislation and for stronger climate-related safeguards within provisions concerning non-forestry uses.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/su182110869/s1: File S1: Structured Literature Search Strategy, Search Results, Screening Decisions, and Originality Assessment; File S2: Practitioner Questionnaire.

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Abbreviations

The following abbreviations are used in this manuscript:

AFOLU	Agriculture, Forestry and Other Land Use
AHP	Analytic Hierarchy Process
CI	Consistency Index
CR	Consistency Ratio
CVI	Content Validity Index
DKMP	General Directorate of Nature Conservation and National Parks
I-CVI	Item-level Content Validity Index
IPCC	Intergovernmental Panel on Climate Change
NDC	Nationally Determined Contribution
GDF	General Directorate of Forestry
RI	Random Index
S-CVI/Ave	Scale-level CVI, averaging method
S-CVI/UA	Scale-level CVI, universal agreement method
WCS	Weighted Climate Score

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