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Innovation, Economic, and Legislative Dimensions of Drone Systems for Forest Fire Management in Albania

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Abstract

Forest fires represent a considerable environmental and economic issue in Albania, intensified by climate change, human activities, and deficiencies in institutional capacity. The annual costs exceed 160 million euros, resulting in significant impacts on biodiversity, ecosystem services, property values, and the development of regional GDP.

This article examines the policy and economic ramifications of incorporating drone-based systems into the framework for managing forest fires in Albania. Using a case study of Dajti Mountain National Park and qualitative interviews with forestry experts, policymakers, and local stakeholders, it evaluates the potential of unmanned aerial vehicles (UAVs) to strengthen monitoring, prevention, and suppression capacities. Economic modelling shows that drones are up to 80% cheaper than helicopters and can prevent GDP losses of 0.11 - 0.18% annually in affected regions, thereby safeguarding tourism, rural livelihoods, and ecosystem services.

From an innovative perspective, UAVs provide scalable solutions for early detection, real-time monitoring, and targeted suppression. Economically, their cost-efficiency translates into annual savings of millions of euros. Legislatively, however, Albania's National Civil Emergency Plan lacks explicit provisions for UAV integration, and implementation is hindered by underfunded institutions

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and bureaucratic inefficiencies. Public - private partnerships (PPPs) emerge as a viable financing mechanism, drawing on Albania's successful PPP experience in the energy sector. Aligning drone adoption with EU standards, the Sendai Framework, and the European Green Deal would modernize disaster risk governance and support Albania's EU accession agenda.

The article concludes that incremental UAV adoption - prioritizing Wildland - Urban Interfaces, leveraging PPPs, and integrating drone-generated data into national systems - can deliver measurable economic benefits, advance innovation, and strengthen Albania's compliance with international frameworks.

Keywords: Albania; forest fires; drones; unmanned aerial vehicles; public - private partnerships; disaster risk reduction; economic impact; climate policy; environmental governance; ecosystem services

INTRODUCTION

Albania's forests, which span around 36% of the country's land area, offer essential ecosystem services including the conservation of biodiversity, carbon storage, water management, and soil stabilization. Additionally, they play a vital role in promoting tourism, timber production, and the livelihoods of rural communities. These multifunctional landscapes are increasingly threatened by forest fires, which have grown in frequency, intensity, and economic impact over recent decades. Severe fire seasons, such as those recorded in 2007, 2011, 2012, 2017, and most recently in 2025, have caused extensive damage, with annual economic costs exceeding 160 million euros. These damages extend beyond immediate destruction of forest cover to include indirect losses in agricultural productivity, rural development, health outcomes, and infrastructure integrity.

Forest fires in Albania are primarily caused by human activities, with research indicating that as much as 84% of these incidents can be linked to actions such as agricultural burning, carelessness, and unlawful logging. Climate change compounds these pressures, increasing the frequency of droughts, prolonging fire seasons, and raising average summer temperatures. The interaction between socio-economic pressures and climate drivers has positioned Albania as one of the most fire-vulnerable countries in the Western Balkans. This vulnerability is particularly acute in Wildland - Urban Interfaces (WUIs), where settlements and economic assets border forested areas. Such zones, including the Dajti Mountain National Park near Tirana, are both ecologically sensitive and economically strategic due to their contribution to tourism and real estate development.

From a policy perspective, Albania's fire management system is governed by the National Civil Emergency Plan (NCEP), approved in 2004, which outlines the responsibilities of central and local institutions for prevention, suppression, and recovery. However, the effectiveness of the plan has been questioned by United Nations assessments, which highlight fragmented coordination between ministries, underfunded municipal firefighting units, and the lack of adequate equipment and training. The ratio of firefighters to population - 1 per 2,096 inhabitants - is far below EU standards, leaving Albania heavily dependent on ad hoc international assistance during severe fire seasons. These systemic weaknesses undermine proactive fire prevention strategies, such as controlled burning, fuel load management, and real-time monitoring.

Technological innovations, particularly unmanned aerial vehicles (UAVs), offer new opportunities to address these gaps. Globally, drone systems have been integrated into fire management for early detection, thermal imaging, mapping, and even active suppression. In Albania, EXINN Technology Center has developed a patent pending prototype, UAV system equipped with extinguishing payloads and thermal sensors, marking the first steps toward technological modernization of fire management. The system called UFPUS is an acronym of Unified Fire Protection Units and System. It is still under development and has reached a Technology Readiness Level (TR)7 i.e. the system prototype is successfully demonstrated in operational environment. While technical feasibility is evident, successful implementation requires supportive policies, adequate financing, and institutional readiness.

This article explores the policy and economic implications of integrating drones into Albania's forest fire management framework. It addresses the following research questions: (1) What are the main policy gaps limiting the effectiveness of Albania's current fire management system? (2) How can drones contribute to reducing fire risks and economic losses? (3) What financing mechanisms, particularly public - private partnerships (PPPs), are most viable for supporting UAV adoption? By addressing these questions, the study aims to contribute to ongoing debates on sustainable disaster risk governance in Albania, while providing evidence-based recommendations for policymakers and stakeholders engaged in EU integration and environmental policy reforms.

LITERATURE REVIEW

The growing role of unmanned aerial vehicles (UAVs), or drones, in forest fire management has attracted significant academic and policy attention globally. This section reviews key studies addressing the economic and policy dimensions of fire management, with particular emphasis on the integration of drones and their relevance to Albania's context.

1. Economic Impacts of Forest Fires

The economic consequences of wildfires extend beyond immediate suppression costs. Studies from Southern Europe demonstrate that wildfires can reduce regional GDP growth by between 0.1% and 0.2% annually, erode agricultural productivity, and undermine tourism revenues. Research published in ScienceDirect (2020) quantified the regional impact of wildfires, highlighting long-term losses in ecosystem services such as carbon sequestration and water regulation. The Fire Adapted Network (2022) also emphasized indirect economic consequences, including healthcare costs, loss of labor productivity, and increased public expenditure on post-fire restoration. These findings are highly relevant for Albania, where rural communities are disproportionately dependent on forest resources for subsistence and income.

2. Global Experiences with Drones in Fire Management

Globally, drones have proven effective in enhancing fire detection, monitoring, and suppression. The United States Forest Service has reported annual cost savings from deploying remotely piloted aircraft with thermal imaging sensors, which substitute for helicopter flights at savings of up to $548 per operation. European Union projects have thrilled UAVs for early fire detection, achieving reductions in response times by up to 30% and lowering damages. Companies such as FlytBase (2024), Inspired Flight

Technologies (2024), and Microavia (2023) provide practical evidence of UAV integration into fire departments, showcasing reduced risks for human firefighters and enhanced situational awareness. The global firefighting drone market, estimated at $2.2 billion in 2025, is projected to reach $6.3 billion by 2035, reflecting growing demand for cost-effective and scalable fire management tools.

3. Policy and Institutional Frameworks

The successful integration of UAVs into fire management requires enabling policy frameworks. In the United States, the Federal Aviation Administration (FAA) has created certifications for public safety drone operations, while in Europe, the European Union Aviation Safety Agency (EASA) has established protocols for beyond-visual-line-of-sight (BVLOS) operations in fire zones. The UNECE (2019) report on Albania's fire management noted institutional weaknesses, such as fragmented coordination and underfunded municipal firefighting services. While Albania's National Civil Emergency Plan (2004) outlines responsibilities, its implementation is undermined by bureaucratic inefficiencies and limited resources. Research from USDA Forest Service (2023) and the Western Fire Chiefs Association (2024) shows that robust regulatory frameworks are key to enabling technological adoption.

4. Public - Private Partnerships (PPPs) and Fire Management

Public - private partnerships have emerged as an effective tool for financing technological adoption in resource-constrained settings. Albania's PPP Law No. 125/2013 has mobilized private investment in energy projects, such as the Ashta Hydropower Plant, which generated 53 megawatts and leveraged $262 million in private funds. Reports by ASECU (2022), World Bank (2023), and IJECM (2022) highlight both opportunities and challenges of PPPs in Albania, including issues of transparency, equitable risk-sharing, and governance capacity. Applying PPPs to fire management could allow UAV adoption without overburdening public budgets, while also fostering innovation and efficiency. International experiences, such as the Swiss-supported Fire Management Project in the Balkans, demonstrate how PPPs can enhance resilience through co-financing of prevention and monitoring technologies.

5. Albania's Policy Approximation to the EU

Albania's EU integration agenda provides both pressure and opportunity for reforming fire management policies. The Approximation of Policies and Legislation on Forestry (World Bank PPP (2022)) emphasizes the need to align Albania's frameworks with EU environmental directives. This includes strengthening multi-level governance, enhancing data systems, and investing in risk-reduction technologies. Drone integration aligns with the Sendai Framework for Disaster Risk Reduction and with the European Green Deal, which calls for innovation in addressing climate-related hazards. Thus, UAV deployment is not only a technical innovation but also a strategic alignment with Albania's EU accession goals.

Synthesis

The reviewed literature highlights a convergence of evidence: forest fires carry significant economic costs, while drones provide cost-effective and scalable solutions for prevention and monitoring. However, adoption requires robust policies, institutional coordination, and innovative financing mechanisms. For Albania, the challenge lies in transforming international best practices into locally adapted strategies, using PPPs as

a bridge between innovation and implementation. The literature establishes the foundation for this study's empirical analysis, which investigates how drones could be integrated into Albania's fire management framework to reduce economic vulnerability and strengthen governance.

METHODS

This study adopted a mixed-methods research design to explore the policy and economic implications of integrating drone systems into Albania's forest fire management framework. The methodological approach combined qualitative data collection with secondary quantitative analysis, allowing for a comprehensive examination of both institutional and economic dynamics.

1. Research Design

The study followed a case study methodology, focusing on Dajti Mountain National Park, a Wild land-Urban Interface (WUI) located near Tirana that has historically been vulnerable to forest fires. The case study approach provided in-depth insights into local realities while serving as a representative example of broader national challenges. Data was collected through semi-structured interviews, field observations, and desk research of official policy documents and economic reports.

2. Stakeholder Interviews

Primary data collection involved semi-structured interviews with 11 stakeholders between March and May 2025. The sample included seven experts from the Agricultural University of Tirana, the Institute of GeoSciences, Energy, Water, and Environment (IGEWE), and the Tirana Fire Department, along with four employees of Dajti Mountain National Park (a ranger, a business manager, and staff from hospitality facilities). Interviews lasted between 45 and 60 minutes, covering themes such as perceptions of current fire management practices, drone feasibility, potential barriers to implementation, and preferred financing mechanisms.

Interview data were transcribed and coded thematically using qualitative analysis software. Key themes identified included "bureaucratic inefficiencies", "equipment shortages", "PPP preference", and "economic feasibility". Coding reliability was ensured through cross-checking by two independent researchers.

3. Study Analysis

The Dajti case study included both historical and contemporary data. Fire incident records from summer 2012, summer 2017 to the last summer of 2025 were reviewed, highlighting recurrent vulnerabilities and institutional responses. Field visits enabled observations of fire-prone areas, fuel accumulation, and existing monitoring practices. Special attention was given to tourism facilities and residential structures adjacent to forest zones, given their economic significance and exposure to fire risks.

4. Secondary Data Sources

Quantitative data were drawn from multiple secondary sources, including World Bank and UNECE reports on wildfire impacts, government policy documents, and peer-reviewed studies on the economic costs of forest fires and UAV applications. These sources provided estimates for economic modelling, such as the comparative costs of

helicopters versus drones and the annual GDP losses attributable to wildfires in Albania.

5. Economic Modelling

The economic dimension of the study was analyzed through cost - benefit modelling, informed by international benchmarks. Savings from UAV deployment were estimated by comparing operational costs with those of traditional suppression methods. Global evidence indicates that drones are up to 80% cheaper than helicopters, with cost reductions of $548 per substitution operation in the US. These figures were adjusted for Albania's lower cost structures. Estimates of GDP loss reduction (0.11 - 0.18%) were derived from UNECE and ScienceDirect studies, applied to the Albanian context.

6. Ethical Considerations

Ethical protocols were observed throughout the study. Informed consent was obtained from all interview participants, and anonymity was ensured to protect respondents' identities. Sensitive economic data were used in aggregate form to avoid disclosure of proprietary or individual information. The study adhered to academic research ethics standards of the Agricultural University of Tirana.

7. Limitations

The study acknowledges several limitations. First, the small sample size of interviewees may not capture the full diversity of stakeholder perspectives across Albania. Second, the focus on a single case study (Dajti Mountain National Park) limits the generalizability of findings, although triangulation with secondary data mitigates this risk. Third, economic modelling relies on global benchmarks due to the scarcity of local UAV cost data, which may lead to conservative or optimistic estimates. Despite these limitations, the methodological design ensures a robust foundation for analyzing the policy and economic implications of UAV adoption.

RESULTS

The findings of this study reveal significant policy, institutional, and economic gaps in Albania's forest fire management system, while also underscoring the potential of drone technologies to enhance prevention, monitoring, and suppression capacities. Results are presented in four subsections: (1) institutional and policy gaps, (2) stakeholder perceptions, (3) economic modelling, and (4) case study insights from Dajti Mountain National Park.

1. Institutional and Policy Gaps

Interviews and document analysis indicate that Albania's National Civil Emergency Plan (NCEP) provides a framework for fire prevention and response yet suffers from systemic weaknesses in implementation. Stakeholders reported that responsibilities between ministries and municipalities remain fragmented, resulting in slow and uncoordinated responses during peak fire seasons. Municipal firefighting units lack adequate human and material resources, with the firefighter-to-population ratio standing at 1:2,096 - far below EU averages. Furthermore, fire prevention strategies such as controlled burns and fuel load management are rarely executed due to insufficient funding and expertise.

2. Stakeholder Perceptions

Interview data showed broad support for the integration of drone technologies into Albania's fire management system. All 11 stakeholders expressed optimism about drones, particularly for monitoring purposes. 100% of respondents identified UAVs as highly effective for early detection and real-time surveillance, while 36% highlighted their utility in prevention (e.g., fuel mapping) and 18% saw potential in active suppression (e.g., payload delivery). Concerns raised included bureaucratic inefficiencies (40% of responses), high upfront costs (30%), and technical feasibility challenges (10%). Despite these reservations, a majority (43%) of stakeholders favored public - private partnerships (PPPs) as the most viable implementation model, while 29% preferred government ownership and 28% supported private sector-led initiatives.

3. Economic Modelling

The economic analysis demonstrated that forest fires impose substantial direct and indirect costs on Albania. Municipal records - though often incomplete - suggest annual damages exceeding 160 million euros, consistent with estimates from UNECE (2019) and GFDRR (2023). These costs include loss of biodiversity, reduced agricultural output, property destruction, and negative impacts on tourism. Long-term effects include GDP growth reductions of 0.11%-0.18% in wildfire-affected regions, aligning with regional estimates from Southern Europe.

Drone adoption could significantly reduce these losses. UAVs are estimated to be up to 80% cheaper than helicopters for aerial monitoring and suppression. Applying global benchmarks, UAV substitution could yield savings of approximately $548 per operation. When scaled to Albania's average fire season, potential savings range between 3 - 5 million euros annually. Additionally, by enabling early detection, UAVs could prevent 20 - 30% of damages in vulnerable areas, amounting to avoided losses of 32 - 48 million euros per year.

4. Case Study: Dajti Mountain National Park

The Dajti case study shows the localized impacts of fire vulnerability and the potential benefits of drone integration. The park, located adjacent to Tirana, is a popular destination for tourism and recreation, contributing to the local economy through hospitality, real estate, and transport services. Fires in 2012 and subsequent years required volunteer-based responses due to inadequate firefighting resources. Stakeholders highlighted that drone-based monitoring could enhance early warning systems, improve response times and reduce reliance on external assistance.

Economic modelling specific to Dajti suggests that UAV integration could prevent up to 25% of damage annually, equivalent to several million euros in avoided costs. Moreover, drones could protect tourism revenues by safeguarding the park's natural assets, which form a critical component of Tirana's recreational and economic landscape.

5. Summary Table of Findings

The following table synthesizes the results across prevention, monitoring, and suppression dimensions. The comparative assessment demonstrates that UAV adoption directly addresses critical weaknesses in Albania's fire management system. In the prevention dimension, drones enable precise fuel load mapping and support for controlled burns, which could reduce annual wildfire damages currently estimated at up to €160 million. In terms of monitoring, UAVs provide real-time surveillance and

thermal imaging, overcoming delays and inaccuracies in existing fire bulletins and preventing regional GDP losses of 0.11 - 0.18%. Finally, in the suppression phase, drones equipped with payload delivery systems offer cost-effective access to mountainous terrain, generating annual savings of €3 - 5 million compared to helicopters. Collectively, these findings indicate that UAVs represent not only a technological innovation but also an economically strategic intervention, with direct implications for safeguarding rural livelihoods, ecosystem services, and Albania's long-term resilience.

Table 1. Policy, technological, and economic implications of UAV integration in Albania's forest fire management

Aspect	Current Gaps	Drone Potential	Economic Impact
Prevention	Limited and fragmented fuel reduction measures	Fuel load mapping and support for controlled burns	Avoided wildfire damages of up to €160 million annually
Monitoring	Inaccurate and delayed fire bulletins	Real-time surveillance with thermal imaging	Reduction of regional GDP losses by 0.11 - 0.18%
Suppression	Limited access in mountainous terrain	UAV-based payload and retardant delivery systems	Annual suppression cost savings of €3 - 5 million compared to helicopters

Synthesis of Results

Overall, the results highlight both the inadequacy of Albania's current fire management system and the transformative potential of UAV technologies to reduce policy and economic vulnerabilities. Stakeholders broadly support UAV integration, particularly through public - private partnerships (PPPs), while economic modelling indicates substantial cost savings and avoided damages. The case study of Dajti Mountain National Park provides tangible evidence of how drones could reshape fire management in Albania's most vulnerable areas. By combining innovation, economic efficiency, and policy alignment with EU frameworks, UAVs emerge as a strategic pathway to modernize disaster risk governance and enhance resilience at both local and national scales

DISCUSSION

The discussion integrates the findings from stakeholder interviews, case study analysis, and economic modelling to evaluate the broader policy and economic implications of integrating drone technologies into Albania's forest fire management system. The discussion is organized into four subsections: (1) policy implications, (2) economic considerations, (3) implementation pathways, and (4) alignment with EU integration and international frameworks.

1. Policy Implications

The results highlight a persistent gap between Albania's regulatory framework, as articulated in the National Civil Emergency Plan (NCEP), and its practical implementation. Bureaucratic inefficiencies, fragmented institutional responsibilities, and underfunded municipal firefighting units undermine proactive fire management. Drone integration could help bridge this gap by strengthening prevention and monitoring capacities. By generating real-time data, UAVs can inform evidence-based decision-making, improve accountability, and facilitate coordination among institutions.

Policy reform is necessary to enable UAV adoption. Current Albanian legislation lacks provisions for drone use in emergency management. Amending forestry and civil protection laws to explicitly recognize UAVs would create a legal foundation for integration. Lessons can be drawn from the United States, where the Federal Aviation Administration (FAA) has established certifications for public safety drone operations, and from the European Union Aviation Safety Agency (EASA), which has introduced risk-based frameworks for beyond-visual-line-of-sight (BVLOS) flights. Adopting similar standards would align Albania with EU best practices while enhancing domestic capacity for innovation.

2. Economic Considerations

From an economic perspective, drone integration offers substantial potential to reduce the costs of forest fires in Albania. Economic modelling demonstrated that UAVs are up to 80% cheaper than helicopters, yielding potential annual savings of €3 - 5 million in suppression costs alone. More importantly, UAV-enabled early detection could prevent 20 - 30% of damages, equivalent to €32 - 48 million avoided losses each year. Such savings have significant implications for rural communities, where fire damage exacerbates poverty and undermines livelihoods dependent on forestry, agriculture, and tourism.

The economic case for UAVs extends beyond suppression. By safeguarding ecosystem services, drones contribute to long-term resilience. Forests play a central role in carbon sequestration, water regulation, and soil stabilization. Preventing fire-related degradation protects these services, which carry substantial economic value. For example, the cost of soil erosion following severe fires has been estimated at 20 tons - 90 tons per hectare annually, undermining agricultural productivity. Drone adoption, by reducing fire frequency and severity, helps preserve land value and rural incomes.

3. Implementation Pathways: Public - Private Partnerships

Stakeholder perceptions highlighted the importance of public - private partnerships (PPPs) as a financing and implementation mechanism. PPP Law No. 125/2013 has already mobilized private capital for renewable projects, health care, road and airports construction, waste recycling in Albania, which leveraged up to 2 billion USD 262 in private investment. Extending PPPs to environmental and forest management offers a pathway to scale UAV adoption without imposing unsustainable fiscal burdens on the state annual budget.

However, PPPs must be designed to ensure transparency, equitable risk-sharing, and long-term sustainability. International Monetary Fund (IMF) assessments warn that poorly structured PPPs can expose governments to hidden liabilities. To mitigate these risks, Albania could establish an advisory forum for environmental PPPs, drawing on World Bank and IFC expertise. Pilot projects co-financed by private operators, insurance companies, and municipalities would enable phased UAV deployment while building institutional capacity.

4. Alignment with EU Integration and International Frameworks

Drone integration aligns with Albania's EU accession agenda and international disaster risk governance frameworks. The Approximation of Policies and Legislation on Forestry (World Bank PPP (2022)) stresses the need for harmonization with EU environmental directives. UAVs also advanced commitments under the Sendai Framework for Disaster

Risk Reduction, which emphasizes the use of technology to reduce vulnerabilities in high-risk regions.

Furthermore, UAV adoption supports the European Green Deal's emphasis on innovation and climate adaptation. By integrating drones into fire management, Albania demonstrates progress toward EU-aligned green transition goals while addressing domestic challenges. Such alignment strengthens Albania's accession credentials and attracts external support from EU institutions and international donors.

5. Governance Challenges and Opportunities

Despite their promise, UAVs cannot substitute for broader governance reforms. Bureaucratic inefficiencies and weak inter-institutional coordination remain barriers to effective fire management. Addressing these challenges requires strengthening the capacity of municipal firefighting units, improving training, and ensuring sustainable funding for prevention strategies. UAVs should be viewed as a complementary tool within a comprehensive governance framework.

At the same time, UAV adoption creates opportunities for institutional innovation. By partnering with universities and research centers, Albania can foster local expertise in UAV technology, stimulating knowledge transfer and job creation. Such initiatives would contribute to broader economic development while advancing resilience goals.

Synthesis

The discussion underscores that UAV integration is both a technical and institutional challenge. Technologically, drones provide cost-effective and scalable solutions for prevention, monitoring, and suppression. Economically, they generate measurable savings and protect ecosystem services. Institutionally, their adoption requires legal reform, financing innovation, and improved coordination. In the context of Albania's EU integration and climate vulnerability, UAVs represent a strategic opportunity to modernize disaster risk governance while delivering tangible economic and social benefits.

CONCLUSIONS

This study examined the policy and economic implications of integrating drone systems into Albania's forest fire management framework. By combining qualitative interviews, case study analysis, and economic modelling, it demonstrated that UAVs have significant potential to address persistent institutional and financial weaknesses in Albania's fire governance structures.

The main conclusions are as follows:

1. Policy Gaps

Albania's National Civil Emergency Plan provides a regulatory framework but is weakened by poor coordination, bureaucratic inefficiencies, and underfunded municipal firefighting units. UAVs can help close these gaps by enhancing monitoring and early detection, delivering real-time data for decision-making, and aligning national practices with EU standards.

2. Impact

Wildfires in Albania cause annual damages exceeding €160 million and reduce GDP growth in affected regions by 0.11% - 0.18%. UAV adoption could mitigate these losses by offering suppression cost savings of €3 - 5 million annually and preventing damages of €32 - 48 million. These benefits are particularly important for rural communities dependent on forest resources.

3. Stakeholder Support

Interviews revealed broad optimism about UAV integration. Monitoring was identified as the most realistic application, followed by prevention and suppression. Public - private partnerships (PPPs) emerged as the most viable financing mechanism, consistent with Albania's successful PPP experience in the energy sector.

4. Implementation Pathways

A phased approach is recommended, beginning with monitoring in Wild land - Urban Interfaces (WUIs), such as Dajti Mountain National Park. Pilot projects - supported by PPPs and co-financed by municipalities and private operators - can build institutional capacity and demonstrate tangible economic returns.

5. EU Integration

Drone adoption supports Albania's EU accession agenda, the Sendai Framework for Disaster Risk Reduction, and the European Green Deal. By investing in UAVs, Albania can strengthen domestic resilience and signal progress toward EU-aligned green transition goals.

In conclusion, UAVs represent more than a technological innovation: they are a strategic tool for modernizing disaster risk governance, reducing economic vulnerabilities, and advancing Albania's sustainable development agenda. Policymakers are advised to prioritize UAV integration through enabling legislation, PPP financing, and institutional collaboration with research institutions. If implemented effectively, drone adoption could transform Albania's fire management system into a model of resilience and innovation for the Western Balkans.

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