

Implementation of Forest and Land Fire Prevention Policy at The Forest Management Unit Level

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Abstract: Forest and land fires recur every year in the working area of the Bonehau Kalumpang Forest Management Unit (KPH), West Sulawesi, where 2,252.12 hectares burned between 2016 and 2023. Minister of Environment and Forestry Regulation No. P.32/MenLHK/Setjen/Kum.1/3/2016 guides prevention, yet its implementation at the unit level is poorly understood. This study analyzes how the regulation is implemented and which factors hinder it, using Edwards III's determinants: communication, resources, disposition, and bureaucratic structure. A descriptive qualitative design was applied. Eleven informants (officials, forest police, resort heads, a village head, and farmers) were purposively selected, and data from in-depth interviews, observation, and document study, collected between July and September 2024, were analyzed using the interactive model of Miles, Huberman, and Saldaña. Implementation remains reactive rather than preventive. Burning for land clearing, hunting, and negligence trigger fires, while nine field protection staff and 20 Jet Shooter units cover 81,624.12 hectares; the patrol budget fell from IDR 123.52 million (2020) to IDR 16.38 million (2024), and weak telecommunication and fragmented provincial-unit coordination limit outreach. Customary *seda* sanctions offer a social foundation for community-based prevention.

1. Introduction

Forest and land fires are a recurring environmental problem in Indonesia, and their consequences reach beyond ecological damage to the livelihoods of people living in and around forests. Forests are integrated ecosystems dominated by trees, whereas land refers to terrestrial ecosystems outside forest areas that communities use for agriculture, cultivation, and plantations (Ministry of Environment and Forestry [MoEF], 2016). Because individuals, community groups, and legal entities manage both, fire quickly becomes a social and economic problem for surrounding populations, as well as an environmental one. Research on Indonesia's fire economy links burning to socioeconomic and political conditions and to networks of actors (Purnomo et al., 2017), and commentary on fires and haze in Southeast Asia stresses preventing fires, notably by protecting and restoring peatlands (Tacconi, 2016).

Evidence from several settings indicates that most fire ignitions are linked to human activity. In Central Kalimantan, an analysis of MODIS active-fire data for 2000–2010 showed that most fires started on non-forest land and that ignition density was highest within 5 km of settlements (Cattau et al., 2016). Participatory research on peatlands identifies intentional burning for land clearing, which is attractive because it is cheap, alongside unintentional ignition from discarded cigarette butts and campfires (Syahza et al., 2025). Studies of fire regulation in Central Kalimantan likewise start from the observation that many fires are set by people clearing land (Gultom, 2020). These findings suggest that prevention must address everyday land-use practices, and not only patrols and suppression capacity.

Indonesia has responded with laws, government regulations, presidential instructions, and ministerial regulations, including MoEF Regulation No. P.32/MenLHK/Setjen/Kum.1/3/2016 on forest and land fire control (hereafter Regulation P.32/2016), which defines prevention as all actions, efforts, and activities carried out to prevent or reduce the likelihood of fires (MoEF, 2016). Evidence on how such rules perform is mixed. Studies in Central Kalimantan and Riau report inadequate facilities, personnel, and budgets, weak coordination, and top-down management that excludes lower bureaucratic levels (Gultom, 2020; Roengtam & Agustiyara, 2025). In 2020, national fire management reduced hotspots and burned area, which the authors attribute to training, technology transfer, budget support, and stakeholder synergy, although climatic factors also contributed (Afni et al., 2022). A recent analysis of a new municipal regulation also describes a lag between enacting rules and institutionalizing prevention capacity (Busyairi & Satia, 2026). These patterns illustrate the policy-implementation gap, in which well-intended policy fails to deliver expected results because of how it is carried out (Hudson et al., 2019).

These studies analyze national, provincial, or municipal arrangements. The forest management unit (Kesatuan Pengelolaan Hutan, KPH), the institution expected to carry out forest management at the field level (Maryudi, 2016), has been examined mainly through the lens of institutional design and forest governance (Kim et al., 2016; Maryudi, 2016). A KPH can act as a policy intermediary between central rules and local communities, but only when central and provincial governments provide consistent regulations, clear policy communication, and sustained capacity support (Kim et al., 2016). None of the fire-policy studies reviewed here analyzes implementation at the KPH level, and it remains unclear whether these conditions are met in a remote unit where fires arise from farming and hunting. This gap is what the present study addresses.

The UPTD KPH Bonehau Kalumpang in Mamuju Regency, West Sulawesi, illustrates the problem. West Sulawesi ranks sixteenth nationally among provinces with high potential for forest and land fires (MoEF, 2018), and fires occur every year in the unit, which manages 81,624.12 hectares of forest (UPTD KPH Bonehau Kalumpang, 2019). Data from the Climate Change and Forest and Land Fire Control Center for the Sulawesi Region (Balai PPIKHL Sulawesi, n.d.) show that 2,252.12 hectares burned between 2016 and 2023: 708.18 hectares (31.4%) in other land uses (APL) and 1,543.94 hectares (68.6%) in forest areas. Most communities around the forest depend on agriculture and plantations for their livelihoods, and difficult terrain limits access. Two institutional initiatives were meant to strengthen prevention: the Masyarakat Peduli Api (Fire-Aware Community) program, set up by the West Sulawesi Forestry Service in 2014, and the Fire Control Brigade (Brigdalkarhutla), formed within the KPH in 2017. The program has become inactive because of weak institutional support and limited government engagement, and the brigade operates below capacity because of limited capacity building, human resource development, and budget. The findings reported below point to land clearing by burning, hunting, and discarded cigarettes as the main ignition sources.

This study therefore analyzes how forest and land fire prevention policy, as set out in Regulation P.32/2016, is implemented in the UPTD KPH Bonehau Kalumpang and which factors hinder it, using [Edwards's \(1980\)](#) four determinants of implementation: communication, resources, disposition, and bureaucratic structure. The study contributes by shifting the analysis to the field management unit, linking the regulation's prevention components to an established implementation theory, and showing how customary sanctions and community groups interact with formal implementation. Its objective is to describe implementation at the unit level and identify the factors that determine whether prevention is proactive or merely reactive.

2. Literature Review

Policy Implementation and the Implementation Gap

Policy implementation is the stage at which an adopted policy is translated into action, and it is where many policies succeed or fail. [Hudson et al. \(2019\)](#) argue that the traditional top-down assumptions, namely that intentions precede action and that goals lead directly to instruments and results, are questionable because implementation unfolds in nonlinear, multilevel systems and is affected by overly optimistic expectations, implementation across dispersed governance, weak collaborative policymaking, and short political cycles. This policy-implementation gap is the starting point for studies that ask why well-designed rules produce uneven results in the field.

[Edwards \(1980\)](#) explains the gap through four interacting determinants. Communication concerns whether instructions are transmitted clearly and consistently to those who must carry them out. Resources cover staff, information, authority, and facilities. Disposition refers to implementers' attitudes and commitment, and bureaucratic structure covers standard operating procedures (SOPs) and fragmented responsibility. The model has been applied to fire control in Indonesia: [Afni et al. \(2022\)](#) used it to analyze national fire management during the COVID-19 pandemic, and [Busyairi and Satia \(2026\)](#) used it, together with collaborative governance, to analyze a new municipal fire regulation. Applying the same lens to a forest management unit allows comparison with those studies.

Forest Management Units as Local Institutions

Institutional approaches treat rules, organizations, and informal norms as the context that shapes policy implementation. In Indonesian forestry, the KPH is the institution created to carry out forest management at the field level, but its development through central regulation can add complexity to existing forest administration ([Maryudi, 2016](#)). [Kim et al. \(2016\)](#) show that a KPH can improve forest governance, including partnerships with communities, by acting as a policy intermediary, yet it needs coordinated action from central and provincial governments, more consistent policies and regulations, better policy communication, and sustained capacity-building support. These arguments imply that a KPH's ability to prevent fires depends as much on support from higher levels of government as on its own organization.

Fire governance studies point in the same direction. Weak coordination across levels of government, overlapping mandates, and limited information flow undermine collaboration in Riau ([Roengtam & Agustiyara, 2025](#)), and research on fire governance in Southeast Asia has increasingly turned to institutional coordination, stakeholder collaboration, and policy implementation ([Wicaksono et al., 2026](#)). Local institutions also include informal arrangements: customary law and local wisdom continue to guide land clearing and are applied to burning cases in Central Kalimantan ([Juriyah et al., 2024](#)).

Forest and Land Fire Prevention

In Regulation P.32/2016, forest and land fire prevention comprises all actions, efforts, and activities to prevent or reduce the likelihood of fire (MoEF, 2016, Article 1 paragraph 39). Its legal basis includes the Forestry Law (Law No. 41 of 1999), the Environmental Protection and Management Law (Law No. 32 of 2009), the Law on the Prevention and Eradication of Forest Destruction (Law No. 18 of 2013), Government Regulation No. 45 of 2004 on forest protection (amended by Government Regulation No. 60 of 2009), and Presidential Instruction No. 3 of 2020 on forest and land fire control.

Prevention research emphasizes community participation and ignition drivers. Peatland fire education delivered through Masyarakat Peduli Api (MPA) groups, combining individual and mass communication, has been proposed to increase community participation (Syahza et al., 2025), and a community-service program reports heightened alertness among a fire-concerned community after awareness education (Indrawati et al., 2023). Yet MPA groups can fall short of national targets (Allo et al., 2021), and village incentives in Riau worked more to encourage compliance with existing regulations than to produce voluntary change (Watts et al., 2019). Customary rules add a further layer: local fire-control practices such as firebreaks, burning against the wind, and posting guards are tied to community rituals and rules (Yuniarti et al., 2020).

Conceptual Framework

Regulation P.32/2016 sets out the prevention component of fire control, covering community empowerment, awareness campaigns, risk reduction, preparedness, early warning, and preventive patrols (MoEF, 2016, Article 69). This study groups these provisions into four dimensions and pairs each with one of Edwards' (1980) determinants (Figure 1). Socialization and awareness correspond to communication: whether prevention messages and instructions reach the community, other implementers, and the private sector clearly and consistently. Resources and infrastructure correspond to resources: the budget, equipment, facilities, and competent staff needed for patrols, monitoring, and rapid response.

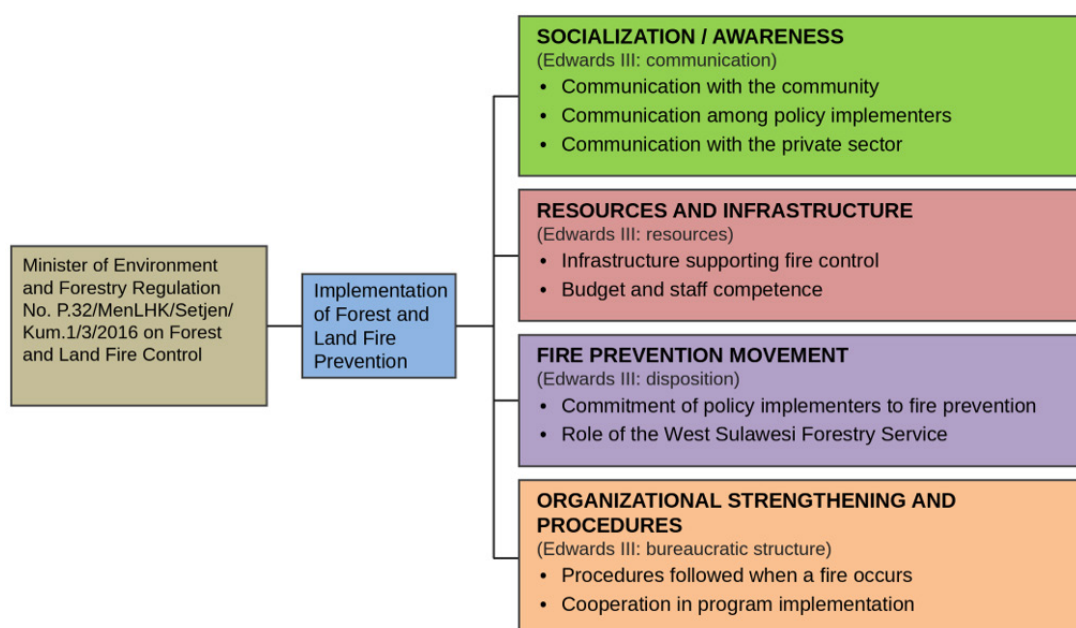


Figure 1. Conceptual Framework of Forest and Land Fire Prevention Implementation
Source: Authors' elaboration based on MoEF (2016) and Edwards (1980).

The fire prevention movement corresponds to disposition: implementers' commitment, the role of the provincial Forestry Service, and the willingness of communities and other parties to join collective prevention. Organizational strengthening and procedures correspond to bureaucratic structure: the division of tasks, SOPs, and coordination that allow a unit to respond consistently. Because Edwards (1980) treats the four determinants as operating together, a shortfall in one can undermine the others, and the framework therefore expects prevention to become proactive only when all four are adequate.

3. Research Methods

This study used a descriptive qualitative design [Doyle et al. \(2020\)](#) to examine policy implementation through the accounts and actions of the actors involved. The study was conducted at UPTD KPH Bonehau Kalumpang, under the Forestry Service of West Sulawesi Province, from 15 July to 10 September 2024, a site chosen for its vulnerability to forest and land fires and the surrounding communities' dependence on forest land. Eleven informants were selected purposively for their authority over, and knowledge of, fire prevention, ranging from structural officials to community members (Table 1). Primary data came from in-depth interviews and direct observation of physical and social conditions, including interviews and observation on 8 August 2024, with the researcher as the main instrument supported by interview guides and observation sheets. Secondary data came from official archives, policy reports, annual records, and scientific literature, and the team documented all activities.

Table 1. Informants by Category and Occupation

No	Informant category	Number	Occupation
1	Civil servants (PNS)	6	Head of the Forest Protection and Natural Resources and Ecosystem Conservation (KSDAE) Division, West Sulawesi Forestry Service; Head of UPTD KPH Bonehau Kalumpang; Forest Police Coordinator; Functional Forest Police Officer; Head of Kalumpang Sub-district; Head of Bonehau Sub-district
2	Non-civil servants (non-PNS)	2	Heads of the Bonehau and Kalumpang Forest Resorts (RPH)
3	Village head	1	Head of Kalumpang Village
4	Community members	2	Farmers/planters in Kalumpang and Mappu Villages
Total		11	

Data were analyzed with the interactive model of [Miles et al. \(2020\)](#), which proceeds through data condensation (reduction), data display, and conclusion drawing alongside data collection. Interview data and field notes were condensed to the material most relevant to the four implementation determinants, displayed through narratives and tables, and interpreted by comparing the findings with Regulation P.32/2016 and with prior studies.

4. Results and Discussion

This section first describes the study site and then presents the findings for each of Edwards' (1980) determinants, preceded by the drivers of fire. Each finding is discussed against prior studies to show where it confirms, extends, or differs from existing knowledge.

Overview of the Study Site

The UPTD KPH Bonehau Kalumpang manages 81,624.12 hectares, all classified as protected forest, divided into three resorts (Kalumpang, Bonehau, and Tabulahan) that cover four districts (Kalumpang, Bonehau, Tabulahan, and Buntu Malangka) ([UPTD KPH Bonehau Kalumpang, 2019](#)). The unit began as

the Protected Forest Management Unit (KPHL) Ganda Dewata and was renamed UPTD KPH Bonehau Kalumpang in 2017, based on digital mapping by the Forest Area Consolidation Center (BPKH) Region VII Makassar. It lies within a province with a designated forest area of 1,068,322 hectares, or 63.64% of the province's 1,678,700 hectares (MoEF, 2021). Within the unit's area, 2,252.12 hectares burned between 2016 and 2023, with 68.6% in forest areas (Balai PPIKHL Sulawesi, n.d.).

Drivers of Fire in Kalumpang and Mappu Villages

Field observation and interviews on 8 August 2024 show that forest and land fires (*karhutla*) in Kalumpang and Mappu Villages are driven mainly by human activity rather than natural phenomena (Figure 2). Land clearing for agriculture is the main factor: farmers burn harvest residue (*sisipan*) and small trees to prepare ground for corn, oil palm, and patchouli, which they see as cheaper and faster than manual clearing. Hunters also set fires to stimulate young grass that attracts deer, and these fires often become uncontrollable in areas dominated by flammable weeds and shrubs. Discarded cigarette butts in dry forest zones add to the problem, particularly during extreme El Niño events such as that of 2023.



Figure 2. Field Interviews with Local Authorities and Residents
Source: Authors' documentation (fieldwork, 8 August 2024)

These findings are consistent with evidence from other regions. Cattau et al. (2016) found that ignitions in Central Kalimantan were concentrated on non-forest land and close to settlements, and Syahza et al. (2025) identified both intentional burning for cheap land clearing and unintentional ignition from cigarette butts and campfires on peatlands. Purnomo et al. (2017) place fire use within wider economic and actor networks, a dimension this study did not examine; in Kalumpang and Mappu, farmers reported cost and speed as motives. Hunting emerges as an additional driver that is not featured in the studies reviewed here. The burned-area record also shows that 68.6% of the area burned in 2016–2023 lay inside forest areas, which is consistent with fires spreading from adjoining farmland and hunting grounds into forest, although the available records do not trace ignition points. Because the main causes are tied to livelihoods, prevention in this setting must engage farm practices, not only patrols.

Communication

The unit communicates prevention through direct coordination with village governments, patrols, and face-to-face socialization intended to raise public awareness. These channels are constrained by the lack of internet connectivity and by mountainous terrain, so the unit depends on physical meetings, which are held irregularly. Communication also follows a top-down pattern that does not take account of the local communication ecology, and in remote areas the absence of telecommunication infrastructure leaves early warning nearly non-functional.

This resembles the uneven policy communication reported in Palangka Raya, where cross-actor socialization was a strength but policy communication remained uneven (Busyairi & Satia, 2026), and the weak information flow found in Riau (Roengtam & Agustiyara, 2025). Community education has been proposed as a prevention tool that combines individual approaches, such as face-to-face service and technical guidance, with mass approaches, such as campaigns, discussion forums, and social media (Syahza et al., 2025), and awareness education has been associated with heightened community alertness (Indrawati et al., 2023). The Bonehau Kalumpang case extends this literature by showing that the mass channels in such models cannot be assumed in remote terrain: where connectivity is missing, the face-to-face channel carries the whole burden, and its irregularity becomes the binding constraint on communication.

Resources

The gap between what the regulation requires and what the unit can deliver is wide. The UPTD KPH has 22 personnel (11 civil servants and 11 non-civil servants), of whom only nine protection staff work actively in the field, and it owns 20 Jet Shooter units for a jurisdiction of 81,624.12 hectares. This equals roughly one field protection officer for every 9,069 hectares and one Jet Shooter for every 4,081 hectares. Infrastructure is also inadequate: the Bonehau resort is operational, but the Kalumpang resort office is damaged and has no electricity.

Financial support for integrated patrols has been highly volatile (Table 2). The allocation fell from IDR 123.52 million in 2020 to IDR 15 million in 2021, a decline of 87.9%, was zero in 2022 and 2023, and recovered to IDR 16.38 million in 2024, only 13.3% of the 2020 level. The absence of funding in 2023 coincided with the extreme El Niño conditions noted above.

Table 2. Budget Allocation for Integrated Patrols, UPTD KPH Bonehau Kalumpang, 2020–2024

No	Year	Budget (IDR)
1	2020	123,520,000
2	2021	15,000,000
3	2022	0
4	2023	0
5	2024	16,380,000

These results confirm the finding in Central Kalimantan that fire regulation was not operationally effective because of inadequate facilities, too few field personnel, and insufficient budget (Gultom, 2020). They also mirror the converse case in the national study by Afni et al. (2022), where the reduction in burned area was attributed to training, technology transfer, budget support, and stakeholder synergy, conditions the unit largely lacks. For KPH in general, Kim et al. (2016) stress sustained support for capacity-building as a condition of effectiveness, and the volatile patrol budget shows that this support is not yet secured. In Edwards' (1980) terms, the resource deficit is the most immediate cause of the shift from patrol-based prevention to after-the-fact response.

Disposition and Community Institutions

Implementers' disposition is positive. The unit's *Semangat Hijau* (Green Spirit) initiative encourages community tree planting, but limited funding and access constrain it. The community groups meant to extend the unit's reach, namely the Masyarakat Peduli Api (MPA) and the forest-police partner communities, are not yet running in the field. Customary institutions remain influential: the *seda*, a customary

sanction in which livestock are sacrificed to compensate for property damage, is a stronger deterrent for local people than formal legal penalties.

The weak presence of MPA is consistent with evidence that MPA groups can fall short of national targets for reducing hotspots and burned area (Allo et al., 2021) and that community-based prevention needs training, guidance, and sustained support to work (Syahza et al., 2025). Village incentive schemes in Riau suggest that incentives operated more to encourage compliance with existing regulations than to drive voluntary change, with awareness of regulations as an important mechanism (Watts et al., 2019); this supports pairing MPA incentives with regulatory awareness. The strength of *seda* aligns with research showing that customary norms still shape land clearing and apply to burning cases (Juriyah et al., 2024) and that local fire-control practices are embedded in community rituals and rules (Yuniarti et al., 2020). The emphasis differs, however: those studies describe customary practices that govern how burning is done, whereas *seda* in Bonehau Kalumpang works as a sanction after damage occurs, adding a deterrent layer that formal enforcement lacks rather than a technique for controlled burning.

Bureaucratic Structure and Procedures

The bureaucratic structure is formally in place. The Fire Control Brigade (Brigdalkarhutla) has existed within the KPH since 2017 and is headed by the KPH head, with a secretariat, two coordinating sections, and two forest police teams that carry out prevention, suppression, and post-fire handling (Figure 3). In practice, fragmentation between the Provincial Forestry Service and the UPTD KPH causes significant delays in logistical support, and the unit cannot consistently execute SOPs. Prevention therefore remains reactive rather than preventive.

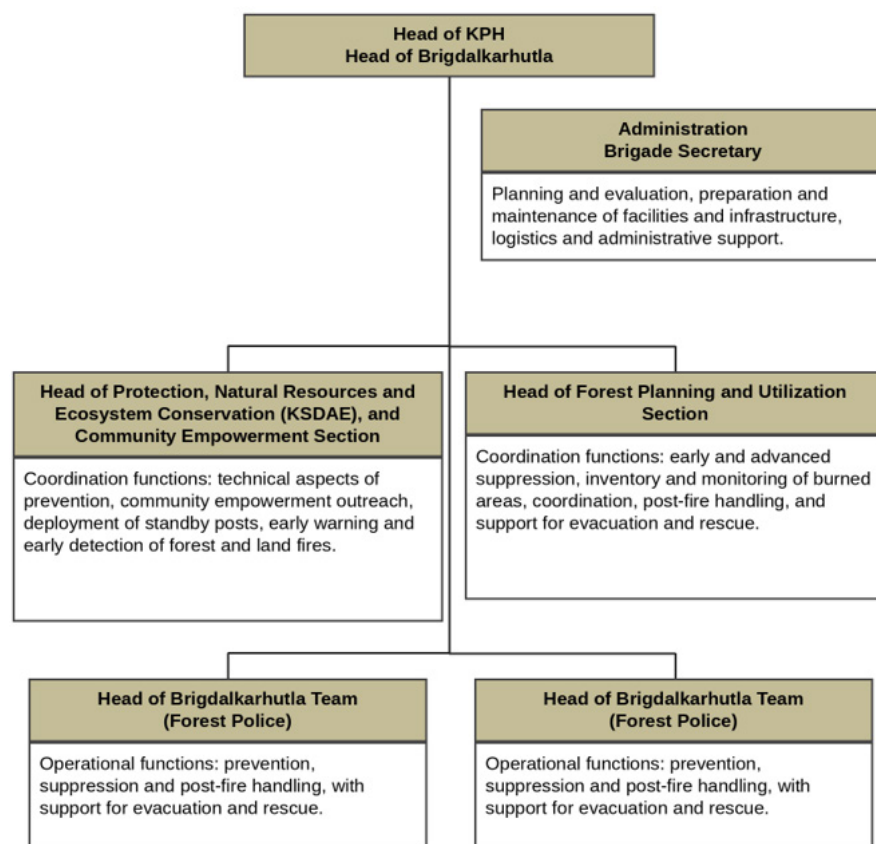


Figure 3. Organizational Structure of the Fire Control Brigade (Brigdalkarhutla) of UPTD KPH Bonehau Kalumpang

This finding echoes the argument that a KPH is an effective intermediary only when central and provincial governments act in a coordinated way and provide consistent regulation (Kim et al., 2016), and that centrally regulated KPH development can add complexity to existing administrative structures (Maryudi, 2016). It parallels the dispersed responsibilities, overlapping mandates, and top-down management reported for fire governance in Riau (Roengtam and Agustiyara, 2025), and it exemplifies the dispersed-governance mechanism that Hudson et al. (2019) identify as a source of implementation failure. The call for cross-sector SOPs in Palangka Raya (Busyairi & Satia, 2026) applies here as well: a brigade that exists on paper cannot prevent fires if logistics and decisions depend on a separate provincial office.

Synthesis and Contribution

Table 3. Summary of Findings and Their Relation to Prior Studies

Dimension	Key finding in this study	Relation to prior studies
Ignition sources	Land clearing for agriculture, hunting, and discarded cigarette butts	Consistent with Cattau et al. (2016) and Syahza et al. (2025); hunting is an additional driver not featured in the studies reviewed
Communication	Irregular face-to-face socialization; limited connectivity and mountainous terrain; early warning nearly non-functional	Confirms uneven policy communication (Busyairi & Satia, 2026); extends education models (Syahza et al., 2025) to remote terrain
Resources	Nine field protection staff and 20 Jet Shooter units for 81,624.12 ha; patrol budget from IDR 123.52 million (2020) to zero (2022–2023)	Confirms Gultom (2020); consistent with Afni et al. (2022) and Kim et al. (2016)
Disposition	Positive implementer attitude; MPA and partner communities not running; <i>seda</i> as a strong deterrent	Confirms Allo et al. (2021); extends Juriyah et al. (2024) and Yuniarti et al. (2020) by showing <i>seda</i> as a post-damage sanction
Bureaucratic structure	Brigdalkarhutla exists since 2017, but provincial–unit fragmentation delays logistics and SOPs are not executed consistently	Confirms Kim et al. (2016) and Roengtam & Agustiyara (2025); consistent with Hudson et al. (2019)

Read together, the four determinants interact. Limited communication infrastructure undermines early warning, low patrol funding removes the presence that deters ignition, and fragmentation between the provincial office and the unit delays the logistics that SOPs assume. This interaction explains why prevention remains reactive despite implementers' positive attitudes, and it is consistent with Edwards' (1980) view that the determinants operate together. The study therefore contributes in three ways. It provides unit-level evidence, which the national, provincial, and municipal studies reviewed here do not; it shows that customary sanctions are a functioning local institution that complements formal enforcement; and it quantifies the capacity gap (one field officer for about 9,069 hectares and a patrol budget at 13.3% of its 2020 level) in terms that can guide resource allocation.

5. Conclusion

This study analyzed how Regulation P.32/2016 on forest and land fire control is implemented in the UPTD KPH Bonehau Kalumpang and which factors hinder it. Implementation has not been optimally

effective and remains reactive rather than preventive. Fires are triggered mainly by land clearing for agriculture, hunting, and negligence in Kalumpang and Mappu Villages. Across Edwards' determinants, communication depends on irregular face-to-face meetings because telecommunication is absent; resources are minimal, with nine active protection staff and 20 Jet Shooter units for 81,624.12 hectares and a patrol budget that fell from IDR 123.52 million in 2020 to zero in 2022 and 2023; and the positive disposition of implementers and the continued strength of customary *seda* sanctions provide a social foundation, yet the MPA and partner communities are not running and the fragmented bureaucratic structure prevents consistent execution of SOPs. These results confirm earlier studies on resource and coordination constraints and extend them by documenting unit-level communication limits in remote terrain and the role of customary sanctions.

Practically, prevention should be revitalized by systematically strengthening MPA groups, supported by sustainable incentives and regular technical training, and the Provincial Forestry Service should align its budgeting and recruitment authority with the operational needs of the KPH. The government could also recognize *seda* customary rules as part of the prevention framework, and a more decentralized policy design would allow the unit to adapt national guidelines to local conditions. Future research should test low-tech communication networks that do not depend on cellular signals and compare several forest management units with larger, more varied samples to examine whether these findings hold elsewhere.

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