JURNAL PERIKANAN DAN KELAUTAN
Volume 31 No. 1, February 2026: 121-128

e-issn : 2721-8902
p-issn : 0853-7607

Evaluation of the Fire-Free Village Program on Forest and Land Fires in Pelalawan Regency (Case Study: Segati Village)

Evaluasi Program Desa Bebas Api terhadap Kebakaran Hutan dan Lahan di Kabupaten Pelalawan (Studi Kasus: Desa Segati)

Hafiz Hazalin Sinaga[1*], Ridwan Manda Putra[1], Muhammad Syafii[1], Budijono[1]
[1]Department of Environmental Science, Postgraduate, Universitas Riau,
Pekanbaru 28293 Indonesia
**email: hafiz.hazalin8011@grad.unri.ac.id*

Received
22 January 2026

Accepted
27 February 2026

Abstract

Forest and land fires pose a serious threat to Pelalawan Regency, undermining environmental sustainability and community well-being. The Fire-Free Village (FFV) program serves as a preventive initiative that promotes active community participation and institutional collaboration. This study aims to analyze internal and external factors influencing the effectiveness of the FFV program and to formulate strategies for strengthening its implementation and adaptability to local conditions. A mixed-methods approach combined with SWOT analysis was employed, focusing on five program-supported villages. The findings indicate that strengths such as strong community participation and government policy support serve as key assets. At the same time, weaknesses and threats include limited resources and the persistent culture of land burning. Optimization strategies include enhancing human resource capacity, developing alternative economic activities, improving early-detection technologies, and promoting education grounded in local cultural values. These findings contribute significantly to the development of more effective and sustainable forest and land fire prevention strategies in Pelalawan Regency.

Keywords: Desa Bebas Api, Forest and land fires, Prevention Strategy

Abstrak

SKebakaran hutan dan lahan merupakan ancaman serius bagi Kabupaten Pelalawan karena mengganggu keberlanjutan lingkungan dan kesejahteraan masyarakat. Program Desa Bebas Api (Fire-Free Village/FFV) berfungsi sebagai inisiatif pencegahan yang mendorong partisipasi aktif masyarakat serta kolaborasi antar lembaga. Penelitian ini bertujuan untuk menganalisis faktor internal dan eksternal yang memengaruhi efektivitas program FFV serta merumuskan strategi untuk memperkuat implementasi dan adaptasinya terhadap kondisi lokal. Pendekatan metode campuran yang dipadukan dengan analisis SWOT digunakan, dengan fokus pada lima desa binaan program. Temuan menunjukkan bahwa kekuatan seperti tingginya partisipasi masyarakat dan dukungan kebijakan pemerintah menjadi aset utama, sedangkan kelemahan dan ancaman mencakup keterbatasan sumber daya serta budaya membakar lahan yang masih berlangsung. Strategi optimalisasi meliputi peningkatan kapasitas sumber daya manusia, pengembangan kegiatan ekonomi alternatif, perbaikan teknologi deteksi dini, dan promosi edukasi berbasis nilai budaya lokal. Temuan ini berkontribusi secara signifikan dalam pengembangan strategi pencegahan kebakaran hutan dan lahan yang lebih efektif dan berkelanjutan di Kabupaten Pelalawan.

Kata kunci: Desa Bebas Api, Kebakaran hutan dan lahan, Strategi Pencegahan

1. Introduction

Forest and land fires (forest and land fires) represent a recurring serious threat in Indonesia, causing environmental damage, public health disruptions, and significant economic losses (Kurniawan et al., 2021). According to the Indonesian Ministry of Forestry, the burned area during 2020-2024 reached 2.4 million ha, mostly in new areas. Impacts extend beyond local scales to global levels, linked to rising greenhouse gas emissions and climate change (Sari et al., 2022).

Pelalawan Regency in Riau Province consistently ranks among Indonesia's most fire-prone areas (National Disaster Management Agency, 2023). Fires here stem heavily from deforestation and anthropogenic activities, especially high-risk burning for land clearing (Adrianto et al., 2024). Burned land data in Pelalawan showing significant fluctuations from 2015-2024 confirm ongoing control challenges (Dewi et al., 2023). In response, Indonesia shifted fire management from reactive suppression to preventive measures since 2016 (Kementerian LHK RI, 2024). The innovative NO SMOKE concept emphasizes technology-social integration for effective mitigation (Syaufina, 2022). Aligned with this, Asian Agri's 2016 Fire-Free Village (DBA) program in Pelalawan implements community-based prevention via economic incentives as behavior change catalysts, paralleling community-based fire management (CBFiM) but warranting deeper sustainability scrutiny (Marlier et al., 2022).

Despite eight years of socialization, empowerment, and mentoring across five villages, fluctuating fire data in intervention areas signal gaps between program duration and effectiveness. Evaluations of similar programs reveal vulnerabilities, such as dependence on external incentives and weak integration of local values (Carmenta et al., 2020). Thus, this study aims to: (1) analyze internal and external factors affecting DBA program effectiveness in Pelalawan using the Strengths-Weaknesses-Opportunities-Threats (SWOT) framework, and (2) formulate strengthening strategies via the SOAR (Strengths, Opportunities, Aspirations, Results) matrix for optimal, adaptive, sustainable implementation.

2. Material and Method

2.1. Time and Place

This research was conducted in Segati Village, Langgam Subdistrict, Pelalawan Regency, Riau Province. The location was selected purposively based on two criteria: (1) its history as a hotspot with significant fluctuations in burned area from 2015 to 2024, and (2) its status as a participant in the Fire-Free Village program since 2016, allowing for an in-depth evaluation of program sustainability. Field data collection was carried out from June to December 2024.

2.2. Methods

This study employs a mixed-methods sequential explanatory design (Creswell & Plano Clark, 2018). The quantitative phase (survey) was conducted first to identify and score key internal and external factors. This was followed by a qualitative phase (in-depth interviews and FGDs) to explore and explain the underlying reasons, dynamics, and contexts behind the quantitative findings. The integration of both data types provides a comprehensive analysis for strategy formulation. The study population included key stakeholders (community leaders, farmer group leaders, village officials, and program facilitators) in Segati Village. Purposive sampling was then conducted to select 11 key informants for in-depth interviews and 10 participants for Focus Group Discussions (FGDs) to ensure representation of all relevant perspectives.

2.3. Data Types, Sources, and Collection Techniques

The data consist of primary and secondary sources, collected through triangulation of techniques as detailed in Table 1.

Table 1. Data Collection Matrix

Variable Category	Specific Variables / Focus	Data Type	Source / Technique	Analysis Tool
Internal Factors	Community participation, local leadership, empowerment, human resource capacity, education level, training experience, alternative livelihoods, local traditions, and awareness level.	Primary & Secondary	2. FGD: With community members. 3. Secondary Data: Program reports, village monographs.	IFAS Matrix, Descriptive Stats
External Factors	Government support, policies, facilitation, expert assistance, infrastructure (communication, transport), economic influences, climate patterns, awards/incentives.	Primary & Secondary	2. In-depth Interviews: With village officials, facilitators, and company representatives. 3. Document Study: Relevant local regulations and program reports.	EFAS Matrix, Descriptive Stats

Variable Category	Specific Variables / Focus	Data Type	Source / Technique	Analysis Tool
Program Effectiveness	Achievement of fire-free targets, sustainability of activities, and changes in community behavior.	Primary & Secondary	1. Document Analysis: Program evaluation reports and fire hotspot data (MODIS/LANDSAT). 2. Interview & FGD: To assess perceived effectiveness.	Comparative Analysis, Thematic Analysis

2.4. Data Analysis

The quantitative analysis involved statistically processing the survey data to generate descriptive profiles, after which the scores were used to populate the Internal Factor Analysis Summary (IFAS) and External Factor Analysis Summary (EFAS) matrices through a weighting and rating process that assessed each factor's level of influence and the program's response, resulting in a clear quantification of the program's Strengths, Weaknesses, Opportunities, and Threats (SWOT). Meanwhile, the qualitative analysis was conducted by transcribing data from interviews, FGDs, and observations, which were then examined using thematic analysis (Braun & Clarke, 2006) through stages of coding, categorization, and theme development to uncover complex social dynamics, stakeholder perceptions, and contextual challenges. Findings from both the quantitative analysis (SWOT matrices) and qualitative analysis (emerging themes) were subsequently integrated to interpret the program's comprehensive condition, and this integrated understanding guided the final formulation of adaptive strategies using the SOAR (Strengths, Opportunities, Aspirations, Results) framework, emphasizing asset-based thinking and participatory future-oriented planning.

3. Result and Discussion

3.1. Overview of Geographical and Socio-Ecological Conditions of Segati Village

Segati Village, located in Langgam District, Pelalawan Regency, Riau Province, is a key location for studying community-based forest and land fire prevention. Geographically, the village is located at 0.1533° South Latitude and 101.674° East Longitude, 39 meters above sea level, and covers an area of 719.56 km². For further details, see Table 2.

Table 2. Territorial Boundaries and Key Characteristics of Segati Village

Aspect	Description
North	Tambak and Sotol Villages
South	Situgal Village
East	Langkan and Pangkalan Gondai Villages
West	Rantau Kasih Village
Dominant Land Type	Peatland (approx. 4,249 hectares)
Peat Depth	Shallow to deep (based on RPPEG Document, Pelalawan Regent Decree No. Kpts. 660/DLH/2021)
Major Land Use	Oil palm plantations and shrublands
Population (2023)	11,812 inhabitants
Main Livelihood	Farming/Agriculture

Sources: BPS (2024)

Ecologically, Segati is highly vulnerable to forest and land fires. Approximately 4,249 ha of its area consists of peatland, which is prone to drying and combustion during the dry season (Pelalawan Regent Decree No. Kpts. 660/DLH/2021). The dominant land use-oil palm plantations and shrublands- further amplify fire risk, particularly from land-clearing activities. This precarious ecological condition is compounded by limited access to fire-prone areas, especially near riverbanks and in remote shrublands, hindering monitoring, early detection, and firefighting efforts. Socio-economically, the community's high dependence on land is a key driver of fire risk. Most of the 11,812 residents work as farmers, leading to intensive interaction with land for agriculture and cultivation. This dependence, despite regulations against burning, perpetuates the practice of using fire for land preparation because of its perceived cost-effectiveness. This interplay between fragile peatland ecology and land-dependent livelihoods creates a complex socio-ecological system where fire prevention programs must operate.

These geographical and socio-ecological conditions, characterized by extensive flammable peatlands, land-based livelihoods, and limited infrastructure, establish Segati Village as a high-risk area and define the challenging context in which the Fire-Free Village (FFV) program is implemented. The following sections analyze the internal and external factors influencing the program's effectiveness within this specific context.

3.2. Implementation of the Fire-Free Village Program in Segati

The Fire-Free Village (FFV) program in Segati Village has been implemented through a multi-faceted intervention strategy since 2016, encompassing capacity building, institutional strengthening, and economic

incentive schemes. The implementation can be categorized into four main pillars: 1) Capacity Building and Infrastructure: Regular socialization and training on fire suppression techniques, fire hazards, and safety procedures were conducted. This was supported by the provision of critical infrastructure, in 2) Luding fire pumps, hoses, nozzles, field equipment, warning signs, and a dedicated fire post as a coordination center.

3) Institutional Strengthening and Surveillance: The program empowered local facilitators (crew leaders) to conduct intensive patrols. These patrols served dual functions: early detection (monitoring peatland conditions) and rapid response to fire hotspots, thereby establishing a community-based surveillance system. 4) Alternative Livelihood Development: To reduce dependence on fire-based land clearing, the program introduced alternative economic activities. These included: (a) Support for land clearing without burning (PLTB) for coconut and durian cultivation (initially 1 hectare), though the coconut failed due to pest infestation; and (b) Beekeeping (Apis cerana and kelulut) initiated in 2018 as a sustainable income source. 5) Incentive Mechanism: The village received a total of IDR 300 million in incentive awards between 2017 and 2024. The disbursement pattern (100% in 2017, 50% in 2021 and 2022, 100% in 2023) was designed to reinforce long-term commitment rather than provide fixed annual grants. 6) This comprehensive approach indicates that Segati Village received substantial intervention across technical, social, economic, and institutional aspects, forming a robust theoretical framework for fire prevention.

3.3. Analysis of Program Effectiveness on Fire Control

Program effectiveness is evaluated by analyzing trends in burned area and hotspot density before and after program initiation, alongside qualitative observations of community capacity. Trend of Burned Area and Hotspots. This section presents the annual trend of burned areas and hotspot occurrences in Segati Village from 2015 to 2024, contextualized within the broader fire patterns of Langgam Subdistrict. The data provide an overview of fire dynamics over the past decade, illustrating fluctuations in fire intensity and frequency that reflect broader environmental, climatic, and socio-behavioral factors influencing fire incidents in the region.

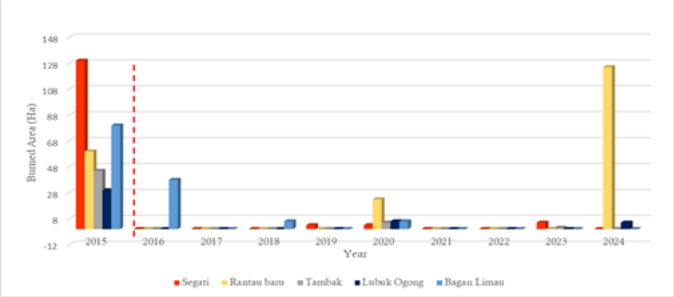

Figure 1. Comparative Trend of Burned Area in Segati Village and Neighboring Villages (2015-2024)

The dashed vertical line indicates the start of the Fire-Free Village (FFV) program in 2016. Segati Village experienced the most severe pre-program fire event (130 Ha in 2015) and the most volatile post-intervention trend, with significant spikes in 2019 and 2023, contrasting with the more stable, declining patterns in neighboring villages like Rantau Baru and Bagan Limau. These comparative trends are essential for understanding the temporal and spatial patterns of fire occurrence and for evaluating the effectiveness of fire prevention and management efforts at the village level. The detailed annual data for Segati Village are presented in Table 3.

Table 3. Burned Area and Hotspot Data in Segati Village (2015-2024)

Year	Burned Area (Ha)	Number of Hotspots (FIRMS-NASA)	Program Phase / Incentive Disbursement
2015	130	389	Before Program
2016	0	14	Program Start
2017	1.1	10	Incentive: 100%
2018	0	23	-
2019	3	144	-
2020	3	3	-
2021	0.5	10	Incentive: 50%
2022	0	2	Incentive: 50%
2023	5	3	Incentive: 100%
2024	0.5	7	Data Collection Year

Sources: Field Observation and FIRMS-NASA.

Reveals a significant immediate impact followed by fluctuating long-term effectiveness. The burned area dropped drastically from 130 Ha (2015) to 0 Ha (2016) at the program's onset. However, the period 2016-2024 shows an inconsistent pattern, with fire-free years (2016, 2018, 2022) interspersed with peaks in burned area (2019, 2020, 2023). Crucially, the total burned area in the nine years post-implementation (13.1 Ha) is dramatically lower than the single pre-program year (130 Ha), suggesting the program has fundamentally reduced the scale of fire events, though not consistently prevented them.

The relationship between hotspots and burned area is complex and non-linear. The year 2015 is an anomaly: 389 hotspots did not escalate into major fires, possibly due to effective emergency response or different fire characteristics. The strong correlation in 2019 (144 hotspots / 3 Ha burned) confirms the utility of satellite detection. However, the critical finding is the decoupling of hotspot count from burned area in severe years. Only 3 hotspots preceded the largest fire (5 Ha in 2023). This indicates severe limitations in satellite-based early warning for certain fire types, likely low-smoldering subsurface peat fires, which are a major risk in Segati's deep peat areas.

Qualitative Indicators of Effectiveness. Beyond quantitative metrics, the program has built tangible community capacity. The existence of trained crew leaders, functional equipment, and an active fire post demonstrates improved institutional readiness for prevention and response. The community's engagement in alternative livelihoods, such as beekeeping, indicates a gradual, though partial, shift in economic incentives away from fire-based clearing.

Synthesis: The Effectiveness Paradox. The program has undeniable success in building infrastructure and capacity and in reducing the overall magnitude of fire damage compared to the baseline. Nevertheless, it suffers from inconsistent annual effectiveness, as seen in the fluctuating burned area. This inconsistency suggests that while the program's structural components (Pillars 1 & 2) are in place, their activation and the community's adherence to fire-free practices are mediated by other dynamic internal and external factors (e.g., climatic extremes like severe drought in 2023, fluctuating economic motivation, or land tenure conflicts). The following section will dissect these influencing factors through the SWOT analysis to explain this paradox and formulate targeted strategies.

3.4. Integrated Analysis of Ecological, Economic, and Socio-Cultural Determinants of Program Effectiveness

The fluctuating effectiveness of the Fire-Free Village (FFV) program, as evidenced by burned-area and hotspot data, can be attributed to a complex interplay of ecological, economic, and socio-cultural factors. An integrated analysis of these determinants is crucial for understanding the program's strategic position. From an ecological perspective, program effectiveness is intrinsically limited by the vulnerability of Segati's deep peatlands, which are prone to subsurface fires that are difficult to detect and extinguish. This is corroborated by the critical finding in Section 3.3, which shows that only 2 hotspots preceded the largest fire (5 Ha in 2023). The existing technical approach, reliant on basic firefighting tools (fire extinguisher, hose) and satellite-based detection (FIRMS), is insufficient to address this specific peat fire challenge. Infrastructure gaps, such as the lack of groundwater wells for wetting peat and specialized equipment for deep peat fires, are compounded by inadequate communication systems (Asteriniah & Sutina, 2017), all of which directly constrain rapid response capacity. This finding reinforces the study by Saharjo & Nurjanah (2021), which highlights the vulnerability of peat ecosystems as a key factor in the dynamics of forest and land fires in Riau. Thus, although the program has reduced overall fire incidents, its technical design has not fully adapted to the local ecological threat.

The program's economic model reveals a critical vulnerability. Investment analysis shows an overwhelming allocation (89% of an IDR 2.93 billion budget) towards short-term operational incentives, such as crew leader patrol wages and village cash rewards. While this structure has proven effective in driving short-term compliance and likely contributed to fire-free years (2016, 2018, 2022), it has simultaneously created a structural dependency trap. This occurs because the overwhelming focus on cash transfers has come at the direct expense of developing viable, long-term alternative livelihoods, which received a minimal 0.8% of the budget, a factor emphasized as crucial for sustainable fire prevention by Windusari et al. (2022). Consequently, community motivation remains tethered to the flux of external rewards rather than rooted in the intrinsic economic benefits of fire-free practices. This economic fragility explains the program's inconsistency: in years when incentive disbursements were perceived as inadequate (e.g., reduced to 50% in 2021 and 2022) or when broader economic pressures (economic impact) mounted, commitment to fire prevention waned, contributing to fire spikes as seen in 2019 and 2023. This dynamic directly corroborates the findings of Yusuf et al. (2019), who posit that unfavorable economic conditions constitute a major threat to community-based programs, as they amplify the incentive gap and push communities back towards risky, familiar land-clearing methods.

Socio-culturally, the program faces the deep-rooted challenge of transforming the entrenched tradition of land clearing by fire, a practice deeply embedded in local culture and tradition (Culture and traditions), as noted by Nasution & Taupiqqurrahman (2020). While consistent socialization has successfully elevated community awareness (Level of awareness) regarding fire risks (Saharjo & Rizkia, 2022), active community participation (Community participation) remains largely passive and tethered to external incentives rather than genuine internalization of norms (Aswin, 2015). This gap between awareness and active engagement points to a lack of big normative change. The institutional mechanism designed to bridge this gap, the Fire Care Community (Fire Awareness Community - MPA), is itself weakened by severe human resource (SDM) capacity deficits (Windusari et al., 2022), operating with only about 16.6% of its required personnel. Furthermore, the MPA lacks a clear organizational (Organization) structure and operational protocol (Evayanti, 2014), rendering it ineffective. Compounding these issues is a multi-stakeholder collaboration model that remains predominantly top-down and is frequently marred by conflicts of interest (Saharjo & Nurjanah, 2021). This combination of cultural inertia, a

weak institutional vehicle, and strained collaboration fundamentally hinders the development of genuine local ownership and adaptive, community-driven problem-solving, leaving the program vulnerable to failure when external support fluctuates.

3.5. Strategic Position Analysis: IFAS and EFAS Matrices

The Internal Factor Analysis Summary (IFAS) and External Factor Analysis Summary (EFAS) matrices summarize the above determinants into a clear strategic profile. Table 5 explains the weights and rankings obtained from survey responses and expert assessments during interviews and FGDs.

Table 4. Internal Factor Analysis Summary (IFAS) for the Fire-Free Village Program

Internal Factors	Weight	Rating (1-4)	Weighted Score
Strengths			
S1. Adequate community education level	0.11	4	0.44
S2. Successful community empowerment	0.09	4	0.36
S3. High community awareness of prevention	0.09	4	0.36
S4. Sufficient program implementation experience	0.09	4	0.36
S5. Active community support & participation	0.08	3	0.24
S6. Involvement of community institution leaders	0.08	3	0.24
S7. Availability of adequate funding	0.08	3	0.24
Total Strengths	0.62		2.24
Weaknesses			
W1. Persistent culture of burning land	0.1	1	0.1
W2. Conflicts of interest among parties	0.09	1	0.09
W3. Limited human resource (volunteer) capacity	0.07	2	0.14
W4. Suboptimal fire prevention training	0.07	2	0.14
W5. Low development of alternative livelihoods	0.06	2	0.12
Total Weaknesses	0.39		0.59
GRAND TOTAL IFAS SCORE			2.83

Table 5. External Factor Analysis Summary (EFAS) for the Fire-Free Village Program

External Factors	Weight	Rating (1-4)	Weighted Score
Opportunities			
O1. Strong government support	0.10	4	0.40
O2. Supportive regulations/policies	0.10	4	0.40
O3. Availability of program mentoring	0.10	4	0.40
O4. Fire-Free Village award as motivation	0.09	4	0.36
O5. Consistent socialization activities	0.08	3	0.24
O6. Support from various organizations	0.07	3	0.21
Total Opportunities	0.54		2.01
Threats			
T1. Limited supporting facilities/infrastructure	0.10	1	0.10
T2. Extreme weather and climate (El Niño)	0.08	1	0.08
T3. Limited number of technical experts	0.09	1	0.09
T4. Inadequate communication facilities	0.07	2	0.14
T5. Difficult access and transportation	0.06	2	0.12
T6. Pressure from community economic conditions	0.05	2	0.10
Total Threats	0.45		0.63
GRAND TOTAL EFAS SCORE			2.64

The combined IFAS score (2.83) and EFAS score (2.64) indicate a favorable strategic position in the first quadrant of the SWOT matrix (Strengths-Opportunities), suggesting high potential for success. The program is built on solid internal capacities, including adequate community education levels and effective community empowerment, factors identified as crucial for community-based fire management (Saharjo & Nurjanah, 2021). These capacities are reinforced by structured training (Aswin, 2015) and accumulated program implementation experience (Harjanti et al., 2024). Externally, the program operates in a highly supportive environment characterized by strong government support and a robust regulatory framework (Dini et al., 2024; Yusuf et al., 2019), as well as consistent program mentoring (Haridison & Kaharap, 2021) and socialization activities (Budiarti, 2023).

However, a deeper analysis reveals the fundamental cause of fluctuating effectiveness: a critical strategic mismatch. While the program successfully leverages procedural opportunities (regulations, mentoring) and soft strengths (awareness, education), it inadequately addresses hard weaknesses—particularly the persistent culture of land burning (Nasution & Taupiqqurrahman, 2020) and underdeveloped alternative livelihoods—and hard threats such as ecological vulnerability and infrastructure gaps (Asteriniah & Sutina, 2017). For example, despite high scores for funding availability, its ineffective allocation toward short-term incentives rather than long-term solutions reflects the weakness of low alternative livelihood development. Similarly, strong government support

does not automatically translate into adequate field-level infrastructure or effectively resolve deep-seated socio-cultural challenges.

3.6. Strategy Formulation: Translating SWOT Analysis into SOAR-Based Action

Based on the strategic position in the Strength-Opportunity (SO) quadrant, an aggressive strategy is called for that leverages internal assets to capitalize on external support. Informed by the SOAR framework, the proposed strategies are designed to address the critical mismatch identified in the analysis directly.

Strategy 1: Shift from Short-Term Incentives to (Long-Term Economic Resilience: a) Objective: Mitigate Weakness (W5: Low alternative livelihoods) and counter Threat (T6: Economic pressure) by transforming the core economic driver from conditional cash transfers to sustainable, community-owned enterprises. b) Rationale & Literature Integration: The current over-reliance on cash rewards creates a fragile dependency. This strategy directly responds to the call by Yusuf et al. (2019) to address the economic root causes of fire-based land clearing. By reinvesting a portion of incentive funds into a revolving Community Enterprise Fund, the program can foster viable alternative livelihoods (alternative livelihood)—a factor critical for sustained behavioral change as emphasized by Windusari et al. (2022). c) Key Action: Reallocate incentive budgets to develop and scale up community cooperatives for bee products, durian, and other non-timber forest products with secure market linkages.

Strategy 2: Fortify Technical Capacity Against Ecological Threats; a) Objective: Address Weaknesses (W3: Limited HR capacity, W4: Suboptimal training) and Threats (T1: Limited infrastructure, T2: Extreme climate, T3: Lack of experts) by building specialized, adaptive capacity for peatland fire management. b) Rationale & Literature Integration: Standard firefighting approaches are inadequate for deep peat fires. This strategy acknowledges the need for specialized expert support (expert) to design appropriate training and technology interventions (Fathan, K., 2020). Furthermore, improving transportation access (means of transportation) is crucial for effective patrols and rapid response in remote peat areas (Indra et al., 2023). Strengthening this logistical backbone and deploying simple groundwater monitoring technology create a hybrid early-warning system tailored to local ecological threats. c) Key Action: Conduct bi-annual, expert-led drills on peat fire suppression and equip communities with specialized tools (peat pumps, moisture sensors) and reliable communication/transport assets.

Strategy 3: Embed Fire-Free Norms through (Cultural and Institutional Revitalization; a) Objective: Confront core Weaknesses (W1: Burning culture, W2: Conflict of interest) by transforming socio-cultural norms and strengthening local institutions to foster genuine ownership. b) Rationale & Literature Integration: Lasting change requires shifting deep-seated norms. This strategy aligns with the findings of Nasution & Taupiqqurrahman (2020), who found that cultural transformation requires the active involvement of traditional leaders and culturally sensitive communication. Simultaneously, it aims to resolve conflicts of interest and strengthen the institutional framework of the MPA by clarifying roles and structures, a key factor for organizational effectiveness in community programs (Saharjo & Nurjanah, 2021). c) Key Action: Launch a sustained "cultural counter-narrative" campaign led by tokoh adat, coupled with a formal restructuring of the MPA to include clear mandates, recruitment drives, and a transparent governance forum involving all stakeholders

4. Conclusions

This study concludes that the effectiveness of the Fire-Free Village (FFV) program in Segati Village, Pelalawan Regency, is characterized by a core paradox: while the program possesses a strong social foundation and policy support (as evidenced by high IFAS and EFAS scores of 2.83 and 2.64, respectively), it has failed to achieve consistent, year-on-year fire prevention. The root of this paradox lies in a critical strategic mismatch. The program's internal soft strengths (e.g., community education and awareness) and external procedural opportunities (e.g., regulations and mentoring) are not effectively leveraged to counteract its most critical hard weaknesses and hard threats. These include: (1) the persistent tradition of land-clearing by fire, (2) economic dependency on short-term cash incentives without sustainable livelihood alternatives, and (3) the ecological vulnerability of peatlands, which is not matched by adequate technical capacity and infrastructure.

5. References

Adrianto, A., Sulistyo, E., & Putri, M. P. (2024). Deforestasi dan kebakaran hutan di provinsi riau: Dampak sosial dan lingkungan. *Jurnal Lingkungan Hidup*, 15(2): 45-60.

Asteriniah, F., & Sutina, S. (2017). Implementasi kebijakan pengendalian kebakaran hutan dan lahan gambut di Ogan Komering Ilir. *Jurnal Abdimas Mandiri*, 1(2): 71-80.

Aswin, A. (2015). *Buku Panduan Sistem Pencegahan dan Pengendalian Kebakaran Berbasis Masyarakat Untuk Kawasan Hutan dan Lahan Gambut Tropis di Provinsi Kalimantan Tengah. Pusat Pengendalian Kebakaran dan Rehabilitasi Hutan Lembaga Pengabdian Kepada Masyarakat (LPKM)*. Universitas Palangkaraya, Kalimantan Tengah.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2): 77-101.

Budiarti, T. (2023). Evaluasi program sosialisasi pencegahan karhutla berbasis kearifan lokal di Desa Makmur. *Jurnal Penyuluhan Kehutanan Indonesia*, 19(1): 22-35.

Carmenta, R., Zabala, A., Daeli, W., & Phelps, J. (2020). Perceptions Across scales of governance and the indonesian peatland fires. *Global Environmental Change*, 62:102067.

Creswell, J.W., & Clark, V.L.P. (2018). *Designing and conducting mixed methods research*. Sage Publications.

Dewi, S., Ekadinata, A., & Agus, F., (2023). Dinamika Kebakaran Lahan Gambut di Kabupaten Pelalawan: Analisis data spasial temporal 2015-2023. *Jurnal Ilmu Lingkungan*, 21(2): 301–315.

Dini, A.R., Setiawan, B., Ali, Y., Harpendya, G., & Munawaroh, F. (2024). The role of local Government in Supporting Community-based Forest fire Prevention Programs in Indonesia. *Journal of Environmental Management*, 351: 119845.

Evayanti, T. (2014). Kelembagaan lokal dalam pengelolaan sumber daya alam: Studi kasus kelompok tani hutan. Societa. *Journal Ilmu-Ilmu Agribisnis*, 12(1): 33-44.

Fathan, K. (2020). *Penegakan hukum terhadap pelaku pembakaran hutan dan lahan di wilayah hukum Polres Dumai*. Universitas Islam Riau.

Haridison, A., & Haharap, A.E (2021). Effectiveness of Mentoring in Community-based Environmental Programs: A Case Study from Peatland Restoration Projects. *Indonesian Journal of Forestry Research*, 8(2): 145-160.

Harjanti, D.T., Putri, H.E., Windusari, F.A., Arini, A.C., & Fujianti, L.N. (2024). Evaluation of community preparedness for forest and land fire management. *Jurnal Pendidikan Sosiologi dan Humaniora*, 15(2): 589-598.

Indra, I., Kamarubayana, L., & Tirkaamiana, M.T. (2023). Studi kebakaran hutan tahun 2015 –2019 berdasarkan aplikasi Sipongi menggunakan citra satelit NOAA di Provinsi Kalimantan Timur. *Jurnal Agroteknologi dan Kehutanan Tropika*, 2(1): 47-70.

Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia. (2024). *Statistik karhutla Indonesia tahun 2023*. Direktorat Pengendalian Kebakaran Hutan dan Lahan.

Kurniawan, R., Suwarno, A., & Hein, L. (2021). The economic and environmental costs of the 2019 forest and land fires in Indonesia. *Nature Sustainability*, 4(8): 654-667.

Marlier, M.E., Liu, T., & DeFries, R.S. (2022). Effectiveness of community-based fire management in Indonesia: A review. *Environmental Research Letters*, 17(5): 053001.

Nasution, A.I., & Taupiqqurrahman, T. (2020). Peran kearifan lokal masyarakat membuka lahan dengan cara membakar sebagai upaya mencegah kebakaran hutan dan lahan. *Jurnal Esensi Hukum*, 2(1): 1-14.

Purnomo, A. (2024). Peran diversifikasi usaha dalam pengurangan pembukaan lahan baru dan pencegahan kebakaran hutan di wilayah tropis. *Jurnal Pengelolaan Sumber Daya Alam*, 19(1): 75–88.

Saharjo, B.H., & Nurjanah, Y.E. (2021). Peran masyarakat dalam pengendalian kebakaran hutan di BKPH Slarang KPH Pemalang. *Journal of Tropical Silviculture*, 12(2): 78-85.

Saharjo, B.H., & Rizkia, A.S.W., (2022). Potensi kebakaran hutan di BKPH Dander, KPH Bojonegoro, Jawa Timur. *Journal of Tropical Silviculture*, 13(2): 131-139.

Sari, N., Putri, E.I.K., & Prayogo, C. (2022). Kontribusi emisi karhutla Indonesia terhadap perubahan iklim global. *Journal Ilmu Atmosfer dan Klimatologi*, 8(1): 45-58.

Syaufina, L. (2022). No smoke: Integrasi teknologi dan sosial dalam mitigasi kebakaran hutan dan lahan di Indonesia. *Jurnal Teknologi Lingkungan*, 9(1): 34-46.

Windusari, F.A., Harjanti, D.T., & Tampubolon, B. (2022). Kapasitas sumber daya manusia dalam kelembagaan pengendalian kebakaran hutan tingkat desa. *Journal Sumber Daya Hutan*, 16(1): 55-70.

Yusuf, A., Hapsoh, H., Siregar, S.H., & Nurrochmat, D. (2019). Analisis kebakaran hutan dan lahan di Provinsi Riau. *Dinamika Lingkungan Indonesia*, 6(2): 67-84.