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Original Article

Assessment of the "No Fire Bonus Plan" as a Forest Fire Prevention Strategy in the Province of Mountain Province: An Explanatory Sequential Inquiry

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Abstract. This study investigated the effectiveness of the "No Fire Bonus Plan" as a forest fire prevention strategy in the province of Mountain Province, employing an explanatory sequential mixed-methods design. The research assessed community awareness of forest fire risks, the Plan's operational mechanics, its implementing guidelines, and the perceived seriousness of implementation challenges. The quantitative phase (surveys) revealed a Very Much Aware (VMA) level regarding forest fire risks (Weighted Mean [WM] = 4.79) and prevention responsibilities, but only a Moderate Awareness (MoA) of the "No Fire Bonus Plan" mechanics (WM = 3.04), indicating a significant gap in operational knowledge. Furthermore, there was Strong Agreement (SA) with the Plan's implementation guidelines (WM = 4.79), confirming community support for transparent, participatory rules. Conversely, the challenges encountered were deemed Very Highly Serious (VHS) (WM = 4.65), driven by concerns over insufficient funding, inadequate training, and a lack of long-term sustainable strategies. The qualitative phase (interviews) explained these findings, revealing two key emergent themes: (1) The Willing but Unskilled Partner (high responsibility but low practical safety knowledge, which complements the high risk awareness but low WM on safety practices) and (2) Institutionalizing the Incentive (a strong desire for the Plan's legal formalization to prevent political interference, which reinforces the VHS rating for funding and sustainability). The results conclude that while the community strongly supports the Plan and understands the risks, the effectiveness of the incentive is severely undermined by organizational gaps and a critical lack of resources, highlighting the need for robust, context-sensitive, and well-funded operational frameworks.

Keywords: *Program assessment; "No Fire Bonus Plan"; Forest fire prevention; Mountain Province; Mixed methods.*

The "No Fire Bonus Plan," a pioneering initiative in Mountain Province, Cordillera Administrative Region (CAR), proposed in 1998 by former Provincial Environment and Natural Resources Officer (PENRO), Manuel L. Pogeyed, exemplifies an innovative approach to forest protection. This plan offers financial incentives to local barangays that maintain a zero-forest-fire record, thereby actively encouraging community participation in fire prevention. Beyond its practical goal, the plan provides a crucial case study in decentralized governance, community-managed resource use, and the effectiveness of incentive-based programs in achieving policy objectives (Calugan, 2024).

Implementing this plan would require complex inter-organizational relationships among Barangay Local Government Units (BLGUs), the Department of Environment and Natural Resources (DENR), and local communities. The Mountain Province experience, though not historically evaluated here, provides important insights into the plan's design, its mechanisms, and the administrative challenges of such an approach – insights relevant to effective administrative and supervisory practices that depend on clearly defined roles and accountability.

Forest fires are a significant and increasing global problem with far-reaching ecological, economic, and social impacts (McCarthy et al., 2024). These events devastate biodiversity, contribute significantly to climate change by releasing greenhouse gases, and disrupt livelihoods. The area burned by forest fires has been increasing, with nearly 12 million hectares burned globally in 2023, contributing to a broader trend in which fires account for approximately 33% of global tree cover loss (Stolte, 2021; Feng et al., 2021). This intensification is often driven by climate change, which creates conditions for larger and more severe fires (WRI, 2021).

The Cordillera Administrative Region (CAR) of the Philippines, known for its rich biodiversity and unique ecosystems, is also increasingly vulnerable to forest fires, particularly during the dry season. The region's unique biophysical characteristics, combined with anthropogenic pressures (such as traditional agriculture and forest encroachment) and topographic influences (such as slope and aspect), make it highly susceptible to wildfire ignition (National Park Service, 2023; Grumstrup, 2024). Recent statistics show an alarming increase in the area of managed forest fires in the CAR, with over 14,975.73 hectares reported during the first semester of 2024 alone (DENR, 2024). This local vulnerability underscores the urgent need for effective preventive measures, and the "No Fire Bonus Plan" is a crucial local strategy to address it by leveraging community stewardship.

The Philippines addresses forest fire management through its national framework, notably Presidential Decree No. 705 (The Revised Forestry Code of the Philippines) and Republic Act No. 9514 (Fire Code of the Philippines), which strengthen the Bureau of Fire Protection (BFP) and outline fire prevention and control measures. However, the traditional fire management model, with a command-and-control approach, focused primarily on suppression. This model is often unsustainable and can be counterproductive, potentially creating a "suppression bias" in which subsequent fires burn under more extreme conditions (Kreider et al., 2024). This realization has driven a significant global shift towards Integrated Fire Management (IFM). IFM extends beyond simple suppression to include strong community involvement, robust governance, the integration of ecological principles, and thorough risk management (Synolakis et al., 2024). Such a multifaceted approach includes strategies like controlled prescribed burning and community participation in prevention.

The "No Fire Bonus Plan" is an example of an incentive-based program and a model of decentralized governance in resource management, financially rewarding Barangay Local Government Units (BLGUs) for preventing forest fires within their jurisdiction. This program empowers local communities to take responsibility and actively participate in forest fire prevention, aligning with the principles of Integrated Fire Management (IFM), which combines prevention, suppression, and community involvement to promote ecosystem health and resilience. Originating in the fire-prone Mountain Province in the Philippines, the plan provided financial incentives, including infrastructure projects, to barangays that avoided forest fires, thereby encouraging preventive behavior and fostering local accountability. While the program showed promising community engagement and a decline in fire incidents, challenges such as monitoring limitations and political funding affected its sustainability. This approach reflects broader global examples of incentive-based conservation, such as Costa Rica's Payments for Environmental Services (PES), reinforcing the effectiveness of devolving authority and incentivizing local action in environmental governance (Liagre et al., 2021).

The Philippines has crafted its own Environmental Legislation and Natural Resources Policy within its National Framework, with provisions for forest fire management. Article XII, Section 5 of the Philippine Constitution states that the state must protect the country's natural resources. This law was further advanced by Presidential Decree Number 705 (The Revised Forestry Code of the Philippines), which incorporated fire prevention and control measures into the forest protection guidelines. Republic Act No. 9514 (Fire Code of the Philippines) provides general provisions on forest fire prevention and control, alongside the rest of the country's fire prevention and suppression legislation. This Act strengthens and modernizes the Bureau of Fire Protection (BFP), outlining its powers and functions in responding to various types of fires, including those in forest areas. Although provisions

of RA 9514 on fire safety standards, public awareness, and emergency response are relevant to forest fire management, they are also consistent in principle with several SDG commitments.

The escalation of forest fires, exacerbated by climate change, directly affects the attainment of the United Nations Sustainable Development Goals (SDGs), particularly SDG 15 (Life on Land), which aims to manage forests sustainably, combat desertification, halt and reverse land degradation, and halt biodiversity loss. SDG 15 aims to sustainably manage forests, combat desertification, and halt biodiversity loss. Raging fires are a direct attack on targets, especially Target 15.1, which focuses on the conservation, restoration, and sustainable use of terrestrial ecosystems. By proactively preventing forest fires, the "No Fire Bonus Plan" directly supports progress toward SDG 15, safeguarding forest ecosystems, biodiversity, and the livelihoods of forest-dependent communities. The "No Fire Bonus Plan" in the Cordillera Administrative Region (CAR) represents a promising, community-based, incentive-driven strategy to mitigate the persistent and growing threat of forest fires. However, the successful replication and scaling of this approach depend on a thorough understanding of its operational environment and local reception. A comprehensive analysis of the plan's implications for various contexts is currently lacking.

This study aims to address a critical gap by investigating the implications of the "No Fire Bonus Plan" as a forest fire prevention strategy through four key questions: the respondents' awareness of forest fire risks in their local Cordillera Administrative Region (CAR) communities, their awareness of the "No Fire Bonus Plan" including its goals, incentives, and community responsibilities, their level of agreement with the plan's implementation guidelines, and the perceived seriousness of challenges faced by barangays in implementing the plan. These questions will provide the foundational data needed to assess the plan's current implementation, identify barriers to its effectiveness, and ultimately develop recommendations to strengthen this incentive-based approach within the framework of decentralized governance.

This research provides a vital contribution to fire management and policy in the Philippine context by offering an in-depth analysis of the "No Fire Bonus Plan's" mechanisms and operational challenges. It offers practical advice for policymakers (DENR, BFP, and LGUs) seeking to establish similar incentive-based programs. Crucially, the study's focus on administrative and supervisory considerations addresses the need for clear roles, responsibilities, and accountability—essential preconditions for translating policy intentions into concrete outcomes. In this regard, the research uses frameworks such as adaptive management, which, as emphasized by Glicksman and Wentz (2023), provides a flexible structure for agencies to refine their strategies based on monitoring data and stakeholder input. By focusing on these administrative dynamics, the study is both timely and relevant, contributing to a broader understanding of how innovative, incentive-based programs can be effectively integrated into a comprehensive strategy to enhance the resilience and sustainability of forest ecosystems.

Methodology

Research Design

This research employed explanatory sequential mixed methods (Creswell & Creswell, 2022). It will involve collecting quantitative data first, then explaining the quantitative results using in-depth qualitative data. In the first quantitative phase of the study, baseline information was collected, general trends were identified, and statistical patterns related to the implementation and effectiveness of the "No Fire Bonus Plan" were determined. The second qualitative phase was conducted as a follow-up to the quantitative findings to help explain them. This comprehensive approach was chosen because the complexity of the research topic required both a broad statistical understanding and rich contextual explanations, which can only be achieved through mixed methods.

Research Locale

The primary location for this research is the Philippines' Cordillera Administrative Region (CAR), with Mountain Province as the focal point due to its historical involvement in the "No Fire Bonus Plan." The study population comprises 105 barangays within the municipalities of Bauko, Besao, Bontoc, Sabangan, Sagada, and Tadian. These municipalities were selected for their varied forest environments and diverse experiences with the "No Fire Bonus Plan," enabling comparisons of the program's effectiveness across these areas. While the results may not be fully generalizable to all barangays in Mountain Province, they provide meaningful insights into the intention behind the "No Fire Bonus Plan" in the chosen municipalities.

For the quantitative phase, a sample size of n = 51 barangays was determined using Slovin's formula to ensure a representative sample from the 105 barangays. Stratified random sampling was employed: the 105 barangays were

first stratified by municipality, and simple random sampling (using a random number generator) was then used to select the required number of barangays from each stratum. This approach ensured that each municipality was proportionately represented. Within each of the 51 sampled barangays, key community members, local officials, and known beneficiaries of the Plan were selected as individual respondents, with the final sample size for individual respondents determined by the barangay's administrative structure. For the qualitative phase, a smaller group of key informants (n=21) was selected through purposive sampling. The criteria for selecting these informants included: barangay officials with direct experience in the Plan's implementation; BFP personnel involved in fire management; and DENR officials and personnel with supervisory roles over forest protection and incentive programs.

Research Instrument

The study employed instruments tailored to each phase. Data for the quantitative phase were collected using a structured, researcher-constructed survey questionnaire. The instrument was divided into four main components, corresponding to the Statement of the Problem: (1) Awareness of Forest Fire Risks, (2) Awareness of the "No Fire Bonus Plan," (3) Agreement on Implementation Guidelines, and (4) Degree of Seriousness of Challenges Encountered. The validity and reliability of the questionnaire were not established, as it was adapted from the DENR manual on Forest Fire Prevention, Mitigation, Response, and Management (DENR, n.d.) and the No Fire Bonus Plan Program of Mountain Province (Pogeyed, 1998). For the qualitative phase, data were gathered through in-depth semi-structured interview guides. The questions were formulated to directly probe the explanations and nuances underlying the statistical findings from the quantitative phase, focusing on stakeholders' views of the Plan's effectiveness, long-term viability, and necessary reforms.

Data Gathering Procedures

Before disseminating the research questionnaire, a multi-phase data collection process was initiated, including obtaining the necessary permissions. Formal requests will be obtained from the Dean of the Graduate School and the Provincial Governor of Mountain Province. The quantitative data were collected through face-to-face interviews with community members or online surveys, depending on the barangay's accessibility and preference. The face-to-face method was used by trained research assistants to clarify questions and ensure a high response rate. All survey responses collected were tabulated, meticulously checked for completeness, and prepared for statistical analysis. The qualitative interviews with the key informants were conducted using the interview guide. All interviews were audio recorded after obtaining explicit consent from the participants. The audio files were then immediately transcribed verbatim. The researcher implemented the process to ensure direct engagement and accurate contextual understanding.

Data Analysis

For the quantitative data, the analysis utilized Weighted Mean (WM) and Descriptive Statistics to determine the level of awareness, agreement, and perceived seriousness. The thematic analysis examined qualitative information collected from interviews. The method enables researchers to develop a deeper understanding of the group or situation they are studying (Creswell & Creswell, 2022). Through this procedure, recurring themes and patterns were identified and categorized in the data to develop an understanding of stakeholders' perspectives and the plan's implementation. The evaluation was conducted using a Likert scale based on the various statements related to the problem. Ranking was be used across all questionnaire parts to determine the order of the weighted means for problems 1, 2, 3, and 4. The weighted mean was used to determine the order of the response weights.

Aligned with the explanatory sequential method, the researcher collected the data regarding the awareness of forest fire risks, awareness of the "No Fire Bonus Plan," agreement of the implementation guidelines, and the degree of seriousness of implementation challenges through a survey questionnaire (quantitative) and interviewed participants through an interview guide (qualitative). The quantitative phase of this study involved collecting and analyzing numerical data on community awareness of forest fire risks and the "No Fire Bonus Plan," as well as on the perceived seriousness of implementation challenges. Conversely, the qualitative phase examined respondents' narratives and opinions regarding the perceived effectiveness of the "No Fire Bonus Plan" and the factors contributing to its success in promoting community-based fire prevention.

By combining quantitative and qualitative research and data, this study aimed to gain a comprehensive understanding of the plan's potential and weaknesses, leveraging the strengths of each approach while mitigating their weaknesses. In particular, this integration enabled triangulation, using various data sources (community

surveys and key informant interviews) to provide a more detailed and strong consideration of the "No Fire Bonus Plan's" implications for forest fire prevention in Mountain Province. This research's integration occurred primarily during the corroboration analysis, where qualitative findings provided context and deeper meaning to the quantitative results (Creswell & Creswell, 2022).

Ethical Considerations

Before starting the study, the researcher earnestly solicited written permission to use the research instruments from the Provincial Governor of Mountain Province. Each participant received a full letter outlining the researcher's purpose, procedures, and ethical precautions. Respondents and participants were informed that their identities might be disclosed due to data privacy laws. For the sake of anonymity and privacy, strict procedures were implemented to ensure that no one knew the participants' identities. Responses were presented in aggregate form to protect individual privacy. The study will be conducted for academic purposes only, and the researcher will diligently cite and acknowledge all external materials and findings incorporated into the research.

The use of AI in this research is guided by ethical principles that prioritize privacy, security, and fairness in all interactions. All AI-generated outputs are carefully examined and verified by a human subject-matter expert before being presented to or used by others. AI tools are also used transparently, and their use is evident in any research conducted and reported in research papers, reports, or publications. The researcher has a responsibility to use AI and investigative practices in a manner commensurate with the highest standards of integrity and ethical behavior.

The researcher acknowledges the use of generative AI technologies, specifically Gemini AI and Perplexity AI, in the writing and editing of this manuscript. The author utilized AI assistance to format, edit, and enhance clarity. The content was then reviewed, edited, and approved by the author to confirm accuracy, coherence, and adherence to research rigor criteria. The input prompts primarily focused on refining text, paraphrasing, identifying and correcting grammar, condensing content, and formatting. The AI tools were used to complement each other, allowing them to be less focused on a single entity. After using AI assistance, the final manuscript reflects the authors' intellectual work, and the authors bear full responsibility and accountability for its content, accuracy, and interpretation.

Results and Discussion

The findings of this explanatory sequential study are presented below, with the qualitative data used to elaborate and contextualize the quantitative results.

Table 1. *Level of Awareness of the Forest Fire Risks*

	Forest Fire Risks Indicators	Total Weighted Points (TWP)	Weighted Mean (WM)	Descriptive Equivalent (DE)	Rank (R)
1.	Awareness of the factors that contribute to forest fires in your community (e.g., drought, human activities).	243	4.76	VMA	8.5
2.	Knowledge of the potential impacts of forest fires on the environment (e.g., biodiversity loss, soil erosion).	247	4.84	VMA	3.5
3.	Understanding of the economic impacts of forest fires on local communities (e.g., loss of livelihoods, property damage).	247	4.84	VMA	3.5
4.	Awareness of the social impacts of forest fires on communities (e.g., displacement, health risks).	246	4.82	VMA	5
5.	Knowledge of the legal and regulatory frameworks related to forest fire prevention and control.	244	4.78	VMA	6.5
6.	Understanding of your role and responsibilities in preventing forest fires.	249	4.88	VMA	1
7.	Awareness of early warning signs and indicators of potential forest fires.	244	4.78	VMA	6.5
8.	Familiarity with fire safety precautions and best practices to prevent forest fires.	232	4.55	VMA	10
9.	Knowledge of emergency response procedures in case of a forest fire.	243	4.76	VMA	8.5
10.	Awareness of the importance of community-based forest fire prevention efforts.	248	4.86	VMA	2
	Average Weighted Mean		**4.79**	**WMA**	

Table 1 presents the level of awareness of the forest fire risks. The analysis of community awareness reveals a

province with high awareness of forest fire risks, with a weighted mean of 4.79, interpreted as Very Much Aware (VMA). The highest awareness level was recorded for the indicator "Understanding of your role and responsibilities in preventing forest fires" (WM = 4.88). Following closely was "Awareness of the importance of community-based forest fire prevention efforts" (WM = 4.86), reflecting a strong understanding of both personal and collective responsibilities. Despite this overall strong awareness, the indicator "Familiarity with fire safety precautions and best practices to prevent forest fires" had the lowest weighted mean (WM = 4.55). However, it was still categorized as Very Much Aware. The result reveals a critical gap: although the community grasps the functions it serves in fire prevention, knowledge of specific, actionable safety measures remains underdeveloped.

These results align with Thapa et al. (2023), who emphasize that awareness positively influences community participation in mitigation efforts. Similarly, Byerly et al. (2020) underscore that awareness combined with local collaboration encourages engagement in fire prevention. The findings suggest that the community is a willing and capable partner in reducing forest fire risk, offering a strong foundation for scaling up localized prevention initiatives. Participants' testimonies confirm this sense of collective responsibility. A barangay member remarked: *"kanayon san meeting et kana-ibaga or remind tako ta maid man-po-poo dwan, wasdin di man-annad ta maid mapoo-an, uray dasan BFP umali da manpa-training et xa ibaga da," ("We regularly hold community meetings where officials and even the BFP remind us that preventing forest fires is everyone's responsibility, not just the governments.")*

Another barangay official echoed: *"wda san barangay fire brigade tako, kanayon tako met ipa-meeting san fire safety ken prevention" ("Our barangay has volunteer fire brigades, and we regularly discuss fire safety and prevention").* The importance of these initiatives is further affirmed by DENR personnel: *"Information, Education, and Communication (IEC) campaigns emphasized environmental protection. The reward for achieving zero forest fires motivated active participation."* Despite a strong sense of accountability, participants admitted they lacked specific know-how. One barangay member stated: *"Ammo mi ay dapat kami kanayon ay agannad nu man-poo lalo nu summer/dry season, ngem adi mi unay ammo nu kas-anu ekkan or eksakto amagen or kurang san kina-ammo tapnu maid di poo." ("We know we should be careful, especially during the dry season, but we do not know the exact steps to prevent a forest fire.")* Another participant echoed this sentiment and noted the mismanagement of farm waste as a common cause due to a lack of proper techniques.

A local official highlighted mismanagement during agricultural activities as a key fire risk, stressing the need for targeted, practical education. A DENR staff member noted that the February Forest Fire Management training experienced excess demand, highlighting both the importance of such programs and the current training gap. The statement confirms the urgent need to supplement community motivation with hands-on training and fire safety education. Such programs should feature interactive workshops and local demonstrations on agricultural burning, firebreak construction, and fire suppression techniques. These practical approaches, backed by Cosma (2024) and Li et al. (2022), significantly enhance fire prevention capabilities. Inter-agency partnerships among the DENR, BFP, and LGUs can ensure the relevance and sustainability of training. Integrating indigenous knowledge systems also enriches fire management. A barangay captain cited the "Lapat" system—traditional protection ordinances restricting forest access. Such practices align with cultural burning techniques observed in Australia (Maclean et al., 2023), understanding the importance of community-centered, culturally appropriate fire management.

This identified gap between a strong sense of responsibility and limited practical fire safety knowledge presents a pivotal opportunity for focused intervention. Equipping this motivated community with concrete, actionable knowledge of fire prevention measures can amplify their willingness to act responsibly. Participants emphasized the need for government-led training on both prevention and suppression techniques. A DENR response highlighted the potential for integrating these educational campaigns into existing activities with partners such as the BFP and PDRRMO.

A strategic emphasis on creating and executing practical, hands-on training programs is essential to utilize this solid foundation of accountability and address the recognized knowledge gap in fire safety measures and best practices. These efforts should emphasize workshops and demonstrations on specific fire safety measures and optimal practices for the local setting, such as safe agricultural burning and firebreak maintenance. Integrating comprehensive fire prevention training and essential fire safety equipment into the No Fire Bonus Plan can build sustainable, long-term capacity within communities. Literature supports the effectiveness of intensive, practical fire safety training in improving knowledge and self-efficacy (Li et al., 2022; Cosma, 2024).

As demonstrated by successful joint initiatives, institutional cooperation between the BFP and the DENR in the Philippines provides a strong framework for implementing influential training programs. Clear communication channels and systems for reporting, early warning, and coordinated first response are also critical. Furthermore, identifying and encouraging effective indigenous fire prevention practices, such as the "Lapat" traditional ordinance, can bring a distinctively culturally appropriate facet to fire management policy, drawing parallels with models like Australian cultural burning (Maclean et al., 2023; Cycles of Renewal, 2022).

Based on these findings, local government units (LGUs) and barangay councils should prioritize developing and implementing accessible, practical fire safety training programs tailored to their local contexts and practices, in collaboration with the DENR and BFP. Supporting community-based fire prevention initiatives and integrating indigenous practices where appropriate are also crucial. Policy-wise, formalizing practical fire safety training as a key component of community development and environmental protection programs, with incentives and resources, can enhance community preparedness and resilience.

The imperative for a comprehensive analysis of practical fire safety knowledge in this province, in conjunction with regional and national levels (Noviana et al., 2020), is underscored by the escalating threat of wildfires resulting from climate change and land-use practices (Barber et al., 2021). Addressing the behavioral aspects of fire prevention programs (Byerly et al., 2020) and key drivers, such as slash-and-burn agriculture and droughts (Celis et al., 2023), particularly in areas with increasing wildland-urban interfaces (Sharma & Dhakal, 2021), demands urgent attention. Beyond the immediate response, long-term sustainability is vital, supported by environmental service rewards, biodiversity incentives (Berlinck et al., 2021), and climate-resilient agriculture (Magazzino et al., 2023). Integrating advanced technologies into early alert systems (Casallas et al., 2022; Barmpoutis et al., 2020) and ensuring community engagement in agricultural decision-making (Ranjithkumar, 2025) are also crucial for effective, culturally appropriate solutions.

Contrary to a potential assumption of moderate awareness, the province shows a strong "Very Much Aware" level of awareness of forest fire risks. However, this high level of awareness is coupled with significantly lower familiarity with specific fire safety precautions, creating a critical gap between awareness and practical prevention actions.

Table 2. *Level of Awareness of the "No Fire Bonus Plan"*

	No Fire Bonus Plan Indicators	Total Weighted Points (TWP)	Weighted Mean (WM)	Descriptive Equivalent (DE)	Rank (R)
1.	Awareness of the existence and name of the "No Fire Bonus Plan."	170	3.33	MoA	3
2.	Understanding of the program's main objectives (e.g., incentivize community participation, reduce fire risk).	167	3.27	MoA	4
3.	Familiarity with the eligibility criteria for barangays to receive the bonus (e.g., no fire incidents within the barangay during the eligible period).	158	3.10	MoA	5
4.	Awareness of the criteria used to determine the amount of the bonus (e.g., area size, community participation).	112	2.20	SLA	8
5.	Knowledge of the application process for the bonus (e.g., submission of reports, required documentation).	106	2.08	SLA	10
6.	Awareness of how the "No Fire Bonus" is used by the community (e.g., community projects, infrastructure development).	108	2.12	SLA	9
7.	Understanding of the role of the DENR and LGUs in the implementation and monitoring of the bonus plan.	131	2.57	SLA	6
8.	Awareness of any challenges faced in the implementation of the "No Fire Bonus Plan" at the community level.	114	2.24	SLA	7
9.	Belief in the long-term sustainability of the "No Fire Bonus Plan" as a tool for improving forest fire prevention.	242	4.75	VMA	2
10.	Support for the continued implementation and strengthening of the "No Fire Bonus Plan" in the province.	244	4.78	VMA	1
	Average Weighted Mean		**3.04**	**MoA**	

Table 2 presents the level of awareness of the "No Fire Bonus Plan." The average weighted mean of 3.04 indicates a moderate level of awareness (MoA) regarding the No Fire Bonus Plan. The result suggests that while the community supports the plan in principle, awareness of its mechanics—such as application procedures, criteria, and fund utilization—is limited. However, indicators such as "Support for continued implementation of the No

Fire Bonus Plan" (WM = 4.78) and "Belief in its long-term sustainability" (WM = 4.75) reflect strong trust in the initiative's purpose and potential. One BFP staff member emphasized: "*The No Fire Bonus Plan encourages barangays to protect their forests actively.*" Similarly, a barangay official shared: "*San project et mang-remind sinan umili ta maid manpo-poo tay adi pay maid maala tako project nu wada poo" ("The project would promote vigilance in our community, reminding us that causing forest fires could jeopardize our benefits.")*

On the other hand, indicators like "Knowledge of the application process" (WM = 2.08) and "Awareness of the community uses the bonus" (WM = 2.12) reveal significant knowledge gaps. This gap may stem from limited information dissemination and the absence of formal documentation of the No Fire Bonus Plan in recent years. Participants acknowledged these shortcomings. One barangay official stated: "*nadnadnge san No Fire Bonus Plan ngem bakanek opisyal sidi ay time sunga adi ak ammo san process" ("We have heard about the No Fire Bonus before, but I was not a barangay official at the time, so I do not know how the process works now.")* Another barangay official expressed: "*Mayat san project tay ma-enganyo san ad ado, uray nu wda san award ay eted da" ("While we appreciate the recognition, receiving an actual project would bring more lasting benefits.").*

To address this, community awareness campaigns should simplify application guidelines and widely disseminate visible success stories. Clear communication and transparency, as emphasized by Varesco Kager et al. (2022), are essential for effective participation. Addressing this awareness gap requires a multi-faceted communication strategy that provides clear, concise, and locally relevant information about all aspects of the No Fire Bonus Plan. As a DENR personnel emphasized, "*To ensure the long-term adoption… it would be essential first to establish clear and fixed guidelines.*" This strategy should employ diverse channels, including community meetings, culturally adapted materials, radio programs, and targeted social media campaigns (Hyland et al., 2021; Hollmann et al., 2022).

Beyond communication, simplifying application and reward processes is crucial (Guillermo, 2023). Direct assistance and capacity-building initiatives for barangay leaders can also enhance community ownership and participation (Mulyasari et al., 2021). Publicly showcasing successful projects and providing specialized training for community leaders on eligibility criteria, procedural aspects, and permissible uses of the bonus is paramount. Defining straightforward methods for the regular flow of information dissemination and the organized collection of community responses will enable the No Fire Bonus Plan to adapt to changing local conditions. Communication is fundamental (Ferrer et al., 2021). Collaborating with local media to provide regular coverage and valuable information on the No Fire Bonus Plan will further enhance its coverage, reflecting the lessons on effective public communication (Yuliarti & Ariyani, 2023). The DENR, BFP, Local Government Units, and Barangay Councils should prioritize developing and implementing comprehensive communication strategies to raise awareness of the No Fire Bonus Plan, which includes simplifying the application process, clearly outlining bonus utilization, and exploring options to enhance the perceived value and immediacy of the bonus (e.g., providing essential barangay needs).

While this study focuses on a specific region in the Philippines, the findings on the importance of community support, coupled with a clear operational understanding, may be relevant to similar environmental incentive programs in other regions facing challenges in preventing forest fires. Future research could investigate the transferability and adaptability of the No Fire Bonus Plan to various socio-cultural and geographical contexts. Contrary to a potential assumption of moderate awareness, the province exhibits a moderate overall level of awareness regarding the practical mechanics of the No Fire Bonus Plan. Despite strong support for its principles and potential, this low awareness creates a significant barrier to effective participation and implementation.

Table 3 presents the level of agreement in the implementation of the guidelines of the "No Fire Bonus Plan." The average weighted mean of 4.79 reflects Strong Agreement (SA) with the guidelines for implementing the No Fire Bonus Plan. The highest mean (WM = 4.84) was given to "Strong community leadership and active participation," highlighting the centrality of local leadership in successful fire prevention. These findings underscore the community's support for transparent, accountable, and inclusive implementation.

A barangay official emphasized: "*Everyone should know the rules clearly from the beginning. If it is fair and open, everyone will be encouraged to work hard for the bonus.*" Concerns were raised about the need to consider fires originating outside barangay boundaries, with some recommending shared accountability or exemptions based on verified origin. Proposals for tiered reward systems (e.g., zero fire vs. reduced fire incidents) also emerged. The

result indicates that while the principles are widely accepted, their implementation must be context-sensitive and adaptable to each barangay's unique ecological and socio-economic realities. While still within the "Strongly Agree" range, a slightly lower level of agreement is observed for bonus proportionality to community effort (WM = 4.75), suggesting nuanced perspectives on this aspect.

Table 3. *Level of Agreement in the Implementation of the Guidelines of the "No Fire Bonus Plan"*

	Guidelines for the Implementation of the No Fire Bonus Plan Indicators	Total Weighted Points (TWP)	Weighted Mean (WM)	Descriptive Equivalent (DE)	Rank (R)
1.	The "No Fire Bonus Plan" should prioritize preventing all types of fires, including agricultural fires.	243	4.76	SA	9
2.	The eligibility criteria for receiving the bonus should be clearly defined and transparent to all community members.	245	4.80	SA	3
3.	The bonus amount should be commensurate with the level of community effort and the reduction in fire incidents.	242	4.75	SA	10
4.	The criteria for selecting and prioritizing development projects funded by the "No Fire Bonus Plan" are fair and equitable.	244	4.78	SA	6.5
5.	The community is adequately involved in the planning and implementation of development projects funded by the "No Fire Bonus Plan."	244	4.78	SA	6.5
6.	Regular monitoring and evaluation of the "No Fire Bonus Plan" are essential to ensure its effectiveness and identify areas for improvement.	243	4.76	SA	6.5
7.	The "No Fire Bonus Plan" effectively addresses the specific needs and challenges of different communities within the province.	244	4.78	SA	6.5
8.	Strong community leadership and active participation are crucial for the success of the "No Fire Bonus Plan."	247	4.84	SA	1
9.	Inter-agency collaboration and support are essential for the effective implementation of the "No Fire Bonus Plan" (e.g., DENR, LGUs, communities).	245	4.80	SA	3
10.	The "No Fire Bonus Plan" should be sustained over the long term to ensure continuous community engagement and forest fire prevention.	245	4.80	SA	3
	Average Weighted Mean		**4.79**	**SA**	

This strong overall agreement indicates community support for the plan's principles and a general willingness to participate in its implementation. The community values proactive engagement, driven by effective local leadership, and emphasizes transparent eligibility criteria, interagency cooperation, and long-term sustainability. This community-centered perspective aligns with empirical evidence that highlights the importance of community involvement and leadership in successful fire prevention (Eslit, 2023) and the role of transparency in building trust and promoting participation (Ranjithkumar, 2025; Turin et al., 2023).

Participants emphasized the importance of multi-stakeholder involvement in monitoring and evaluation, with representatives from DENR, BFP, and MENRO being specifically mentioned. They also highlighted the need for clear, formalized guidelines. A barangay official articulated, "*To ensure thorough and credible monitoring... it would be beneficial to involve representatives from DENR, BFP, or MENRO....*" A BFP personnel added, "*While some LGUs have verbally mentioned a No Fire Bonus-like program, putting it in writing would ensure transparency....*"

Concerns were raised about the potential manipulation of the bonus system, highlighting the need for robust monitoring and evaluation. As a barangay captain noted, "*elan da san criteria tay wda dasan man-apos, gagaraen da man-poo…" ("The criteria for the bonus require careful consideration due to the possibility of individuals intentionally igniting fires...")* This underscores the importance of explicit criteria, as emphasized by a DENR respondent: "*The primary criterion... would be the absence of any fire...*". Another BFP participant provided operational guidance, stating, "*Reaching zero forest fires could be a first requirement... barangay officials should instruct their constituents always to exercise caution....*"

The strong agreement on the plan's basic principles indicates trust in its philosophy and a belief that its application should be open, justifiable, and accountable, fostering collective ownership. As a barangay official stated, "*Sya san maging armas me san sana No Fire Bonus Plan nu ma-implement…" ("The No Fire Bonus Plan would serve as a significant 'armas' (weapon or tool) for us barangay officials....").* The slightly lower agreement regarding bonus proportionality and prioritizing all fire types suggests that community perspectives on these issues are more complex and context-

dependent. A BFP response indicated that the bonus could motivate less active barangay officials, stating, *"Where there is a lack of initiative... the prospect of a significant project... could provide the necessary encouragement...."* A DENR respondent stressed the need for clear, consistent guidelines to facilitate the long-term adoption of the program: *"To ensure the long-term adoption... it would be essential first to establish clear and fixed guidelines."*

This nuanced perspective reflects an understanding of the diverse ecological, socio-economic, and geographical conditions across the province's barangays. Participants suggested tailoring the plan to these specific needs, potentially through tiered bonus structures or by incentivizing both fire absence and active prevention measures, such as implementing firebreaks. A DENR official cited the effectiveness of firebreak establishment practices in LGU Tadian.

To ensure the plan's long-term efficacy and community involvement, continuous attention to local conditions is crucial (Ryan et al., 2020). This adaptive approach includes ongoing consultations with local government agencies and adaptive management strategies that incorporate monitoring, public input, and responsiveness to changing environmental conditions (Cagasan et al., 2022). Ensuring that the benefits of the No Fire Bonus are perceived as equitable and relevant is also essential. Furthermore, it is important to address the underlying socio-economic factors that contribute to fire use, such as poverty and limited livelihood opportunities. This holistic approach can be achieved through integrated approaches that combine local knowledge with community empowerment (Akbar et al., 2021).

The DENR and BFP, together with Local Government Units and Barangay Councils, should use this strong support as a foundation for active implementation and reinforcement of the No Fire Bonus Plan. This implementation includes disseminating formalized guidelines, ensuring transparency in eligibility and bonus allocation, and conducting regular community meetings and information campaigns. LGUs should formalize the plan through ordinances and facilitate regular inter-agency coordination involving DENR, BFP, and MDRRMO/MENRO for effective monitoring and verification.

Contrary to a potential assumption of moderate agreement, the province shows a strong "Strongly Agree" level of support for the implementation guidelines of the No Fire Bonus Plan. This high level of agreement, however, reveals subtle variations in emphasis on prioritizing all fire types and the direct proportionality of the bonus to community effort, suggesting areas for nuanced consideration and localized adaptation.

Table 4. *Degree of Seriousness of the Challenges Encountered*

	Challenges Encountered Indicators	Total Weighted Points (TWP)	Weighted Mean (WM)	Descriptive Equivalent (DE)	Rank (R)
1.	Lack of sufficient funding for the "No Fire Bonus Plan."	247	4.84	VHS	2
2.	Inadequate coordination and communication among stakeholders (e.g., barangay officials, DENR, LGUs).	244	4.78	VHS	6.5
3.	Limited community participation and engagement in fire prevention activities.	245	4.80	VHS	5
4.	Difficulties in coordinating efforts among barangay officials, community members, and other stakeholders (e.g., DENR, BFP).	246	4.82	VHS	4
5.	Lack of transparency and accountability in the allocation and utilization of bonus funds.	243	4.76	VHS	8
6.	Inadequate training and capacity building for community members on fire prevention techniques.	247	4.84	VHS	2
7.	Lack of clear and consistent guidelines and procedures for the "No Fire Bonus Plan."	244	4.78	VHS	6.5
8.	Political interference or corruption in the program's implementation.	210	4.12	HS	10
9.	Inadequate community awareness and understanding of the "No Fire Bonus Plan" and its objectives.	242	4.75	VHS	9
10.	Lack of sustainable long-term strategies for maintaining community engagement in fire prevention beyond the bonus incentive.	247	4.84	VHS	2
	Average Weighted Mean		**4.65**	**VHS**	

Table 4 presents the degree of seriousness of the challenges encountered. The average weighted mean of 4.74 indicates that the challenges encountered in implementing the No Fire Bonus Plan include insufficient funding (WM = 4.84), inadequate training and capacity-building (WM = 4.84), and a lack of sustainable, long-term perceived as Very Highly Serious (VHS). The most pressing issues are engagement strategies (WM = 4.84). These findings reflect a community that is aware of what is needed for effective implementation but is constrained by

real-world limitations. The funding issue was repeatedly raised: *"mayat nu tuloy-tuloy san pundo na tapnu baken one term di opisyal, uray sino sumukat et wada koma pundo na" ("There should be consistent funding for this plan, regardless of leadership changes,")* said one barangay captain. This high level of concern indicates that the community is acutely aware of the potential obstacles to the plan's success. As Williams et al. (2021) suggest, anticipating and addressing these challenges through meticulous planning, transparent communication, and robust monitoring and evaluation is crucial. Sharpe et al. (2021) emphasize the importance of considering the "magnitude of impact" and "probability of impact" of these challenges on stakeholders.

The "Very Highly Serious" ranking for funding reflects the community's understanding that adequate resources are essential for motivating participation and achieving the plan's objectives. Participants highlighted the tangible benefits of past iterations of the program and expressed hope for its revival, contingent on stable and long-term financial arrangements. One barangay official stated, *"To ensure the lasting impact... it needs continuous implementation, beyond political terms. There should be consistent funding...."* DENR responses acknowledged the issue of inconsistent funding and suggested exploring alternative sources, such as congressional or LGU funds or inclusion in the General Appropriations Act (GAA). The importance of a substantial reward to incentivize barangay engagement was also emphasized.

Compounding the funding challenge is the critical need for comprehensive training and capacity-building programs. The community recognizes that preparedness is directly linked to resource availability. A barangay official stressed that *"Training from government agencies like the DENR... and the BFP is crucial...,"* and a DENR quotation highlighted the insufficiency of current training opportunities.

Political interference was rated slightly lower (WM = 4.12), although still Highly Serious, highlighting concerns about continuity and fairness. To safeguard the integrity, respondents recommended legal institutionalization, regular evaluations, and community-based monitoring. Participants stressed the importance of continuous training, transparent processes, and collaborative leadership among the DENR, BFP, LGUs, and community leaders. The community's awareness of the potential for external and unethical influences to undermine the program's integrity and long-term efficacy. Consequently, safeguards are deemed necessary, including clear rules, independent oversight, accessible community feedback channels, and an effective grievance redressal mechanism. A DENR response emphasized the need for a long-term commitment beyond political cycles and the importance of institutionalization to prevent the program's discontinuation, as seen in past issues.

The community's priorities are clear: securing sustainable funding, developing a long-term strategy, and providing comprehensive training are crucial to the success of the No Fire Bonus Plan. Equally essential is proactively addressing the threat of corruption and interference through robust governance measures to safeguard the initiative's integrity. Overcoming these challenges will significantly enhance the plan's chances of promoting strong community involvement and effectively preventing forest fires. These findings underscore the importance of training for public servants (Bani, 2021) and the relevance of transparency, accountability, and impartiality (Nizmi et al., 2021). The broader context of increasing fire risk necessitates continuous monitoring, strategic resource deployment, community education, policy enforcement, and wildlife protection (Berlinck et al., 2021), all of which are supported by a well-funded and community-engaged No Fire Bonus Plan underpinned by good governance.

Contrary to the assumption that the challenges of implementing the No Fire Bonus Plan are moderate, the community perceives them as very serious. The anticipated lack of sufficient funding, the absence of a sustainable long-term strategy, and inadequate training for community members primarily drive this concern.

This study investigated community awareness of forest fire risks, the No Fire Bonus Plan, and the perceived challenges to its implementation. The findings reveal a high awareness of forest fire risks and a strong acknowledgement of prevention responsibilities, as evidenced by an average score of "Very Much Aware". Most people understand their role and significance in community-based work; however, fundamental gaps in fire safety knowledge hinder practical prevention efforts.

Regarding the No Fire Bonus Plan, awareness of how it works (including what an application entails and how bonuses can be used) is moderate, despite firm belief in its sustainability and support for continued implementation. The positive sentiments about the No Fire Bonus Plan likely stem from personal past experiences

and a desire for efficacy. The difference between firm support and a lack of operational understanding highlights the need for clear communication and accessible information.

Analysis of the No Fire Bonus Plan implementation guidelines shows significant agreement across the province. The community recognizes the crucial roles of leadership, participation, transparent eligibility, inter-agency collaboration, and long-term sustainability. While there is strong buy-in, a slightly lower consensus on bonus proportionality and prioritizing all fire types (including agricultural fires) suggests nuanced local contexts and potential challenges.

Finally, this study focused its assessment of implementation on potential challenges. The community identified the following as very serious: a lack of funding, inadequate long-term, sustainable strategies, and insufficient training and capacity building. Other concerns, such as political interference and corruption, were considered Highly Serious threats to the plan's integrity and longevity. These interconnected challenges necessitate sustainable funding, comprehensive training, and robust governance.

Nonetheless, the study identifies a willing and responsible community poised to participate in forest fire prevention. However, bridging the knowledge gap in practical fire safety and increasing awareness and transparency of the No Fire Bonus Plan are crucial for effective implementation. Addressing funding, training, and political interference is crucial for the long-term success and sustainability of this community-driven approach. Leveraging existing strong community support through targeted actions offers significant potential to mitigate fire risks and protect the region's natural resources.

From a philosophical perspective, the inherent vulnerability of Mountain Province's pine forests underscores the constant ecological pressures that demand human intervention. The high community awareness of fire risks, in contrast to a gap in practical skills, underscores a pragmatic imperative: knowledge must translate into actionable strategies and behavioral change, a process facilitated by incentives such as the "No Fire Bonus Plan." Moreover, the strong community agreement on the guidelines for the No Fire Bonus Plan, coupled with serious concerns about funding, long-term sustainability, and training, underscores an existential responsibility. It reveals communities anchored with collective actions in the face of environmental threats, emphasizing that sustainable forest protection is not merely a technical matter but an ethical commitment to future generations. This support, despite operational knowledge gaps, demonstrates a deep-seated commitment to environmental stewardship and moral ownership of shared natural resources. Ultimately, the study reinforces that while communities understand their environmental role, effective stewardship requires robust, context-sensitive, and ethically guided practical frameworks that empower their intervention and address real-world limitations, making sustainable fire prevention a continuous, collaborative effort.

The study also offers significant theoretical implications, refining Common-Pool Resource (CPR) Theory and Incentive Theory. Regarding CPR Theory, the high community awareness and strong agreement on the "No Fire Bonus Plan" guidelines affirm Ostrom's (1990) emphasis on collective action. However, the moderate awareness of the operational mechanics of the No Fire Bonus Plan and the serious challenges in funding, long-term sustainability, and training reveal a crucial gap: successful CPR management, even with agreed-upon principles, requires robust, consistent, and well-resourced operational frameworks. This evidence suggests that for incentive-based CPR solutions to be practical, foundational elements such as clear, well-resourced operational frameworks are as critical as initial consensus.

Furthermore, concerning Incentive Theory, strong community support for the "No Fire Bonus Plan" in principle validates the motivation by tangible rewards (Deci & Ryan, 2000). However, the moderate awareness of the plan's mechanics indicates that incentive effectiveness is constrained by the clarity and transparency of the delivery system, suggesting that "operant conditioning" must be entirely comprehensible to beneficiaries for optimal alignment.

Finally, identified gaps in practical fire safety knowledge have implications for constructivist, social-cognitive, and experiential learning theories. Despite high general awareness, the lack of specific "know-how" shows that passive information is insufficient for active knowledge construction. Effective fire prevention necessitates experiential learning and social cognitive modelling through hands-on training and demonstrations, implying that successful incentive programs for CPRs must integrate robust capacity-building components that facilitate

active, practical learning for sustained behavioral change and effective resource stewardship.

Conclusion

The findings of this explanatory sequential study provide a comprehensive assessment of the "No Fire Bonus Plan" as a forest fire prevention strategy in Mountain Province, directly addressing the key research objectives established at the outset. The study concludes that the respondents possess a Very High Level of Knowledge about forest fire risks and prevention, primarily attributed to a strong intrinsic understanding of the issue and a willingness to participate in finding solutions. However, this strong motivation is undermined by a critical lack of practical fire safety knowledge, highlighting a significant gap between awareness and actionable prevention strategies.

Regarding the incentive program itself, community awareness of the operational mechanics of the "No Fire Bonus Plan" was only moderate, reflecting a significant lack of accessible, transparent information about its procedures (e.g., application, criteria, fund utilization). This operational obscurity severely limits the incentive's effectiveness despite a Very Strong Agreement on the Plan's guidelines, which confirms the community's demand for fair, transparent, and participatory rules.

Finally, the assessment of implementation challenges revealed that the issues are perceived as Very Highly Serious. The most significant impediments include insufficient funding, inadequate long-term, sustainable strategies, and limited training. These interconnected challenges demonstrate that, while the community stands ready as a motivated partner, the effectiveness and longevity of this incentive-based program are fundamentally undermined by a lack of institutional commitment and organizational resources.

To enhance the effectiveness and sustainability of the "No Fire Bonus Plan," the Department of Environment and Natural Resources (DENR) and the Bureau of Fire Protection (BFP) should prioritize actionable implementation and capacity-building. Specifically, the DENR, in collaboration with the BFP and barangay officials, should conduct at least one hands-on fire prevention training session per high-risk barangay, semi-annually, starting in the next dry season (e.g., Q4 2024/Q1 2025). This training must be tailored to local needs, integrating essential topics like agricultural practices (e.g., kaingin management), safe waste disposal, and effective firebreak construction. Concurrently, the DENR and BFP are directed to launch a clear and consistent communication campaign over six months, utilizing community meetings, local radio, and visual materials, to disseminate detailed, step-by-step procedures for the "No Fire Bonus Plan's" application process, eligibility criteria, and disbursement mechanisms. This action aims to significantly increase community awareness of the plan by 25% and build community trust. Furthermore, the DENR must secure and formalize long-term, dedicated funding for the plan through provincial and national advocacy efforts in the next fiscal year (e.g., FY 2025 budget cycle), ensuring that 50% of allocated funds are reserved for ongoing training and capacity-building to support sustainable fire prevention efforts.

Future research efforts should focus on a deeper, longitudinal understanding of the plan's long-term impacts and its adaptability to new contexts. It is recommended that a comprehensive longitudinal study be initiated within the next year to assess the long-term sustainability of community-based forest fire prevention behaviors and practices over a minimum period of five years following the initial bonus awards. This study should use quantitative metrics (e.g., fire incidence rates, burned-area size) and qualitative methods (e.g., semi-structured interviews) to determine whether the financial incentives lead to an ingrained, autonomous prevention culture. Additionally, subsequent research should be commissioned to investigate the transferability and adaptability of the "No Fire Bonus Plan" in at least two distinct socio-cultural and geographical contexts within the Philippines (e.g., a coastal region and an upland region) to identify critical success factors and necessary modifications for wider policy adoption.

Contributions of Authors

Dr. Beberly Tauli-Calugan served as the principal researcher of the study. She led the conceptualization, research design, data collection, and analysis. She also authored the initial draft of the manuscript, integrating key insights and ensuring methodological rigor throughout the research process. **Dr. Lillian S. Pagulongan**, as the corresponding author, provided critical guidance and scholarly oversight. She contributed to refining the interpretation of findings, enhancing the discussion, and ensuring the manuscript met the highest standards of academic writing. The successful completion of this study reflects the authors' collaborative efforts and complementary expertise.

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Conflict of Interests

The authors have no conflict of interest to declare that is relevant to the content of this research.

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References

Akbar, A., Adriani, S., & Priyanto, E. (2021, April). The potential for peatland villages to prevent fire: Case study of Tumbang Nusa Village Central Kalimantan. In IOP Conference Series: Earth and Environmental Science (Vol. 758, No. 1, p. 012017). IOP Publishing.

Barber, N.R., Alvarado, E., Kane, V., Mell, W., & Moskal, L.M. (2021). Estimating fuel moisture in grasslands using UAV-mounted infrared and visible light sensors. Sensors, 21(19), 6350. https://doi.org/10.3390/s21196350

Barmpoutis, P., Papaioannou, P., Dimitropoulos, K., & Grammalidis, N. (2020). A review on early forest fire detection systems using optical remote sensing. Sensors, 20(22), 6442. https://doi.org/10.3390/s20226442

Berlinck, C.N., Lima, L.H.A., Pereira, A.M.M., Carvalho, E.A.R., Jr., Paula, R.C., Thomas, W.M., & Morato, R.G. (2021). The Pantanal is on fire and only a sustainable agenda can save the largest wetland in the world. Brazilian Journal of Biology, 82. https://doi.org/10.1590/1519-6984.244200

Byerly, H., Meldrum, J., Brenkert-Smith, H., Champ, P., Gomez, J., Falk, L., & Barth, C. (2020). Developing behavioral and evidence-based programs for wildfire risk mitigation. Fire, 3(4), 66. https://doi.org/10.3390/fire3040066

Cagasan, E.G., Gravoso, R.S., Bales, M.C., Bulayog, E.F., Ongy, E.E., & Alao, F.T. (2022). Surfacing development needs of a marginal upland community through participatory tools: The case of village in Samar, Philippines. Annals of Tropical Research, 44(1), 99–113.

Calugan, B.T. (2024). Forest fire suppression in Benguet: A systematic review. Innovations, (79).

Casallas, A., Jiménez-Saenz, C., Torres, V.J., Quirama-Aguilar, M., Lizcano, A., López-Barrera, E.A., Ferro, C., Celis, N., & Arenas, R. (2022). Design of a forest fire early alert system through a deep 3D-CNN structure and a WRF-CNN bias correction. Sensors, 22(22), 8790. https://doi.org/10.3390/s22228790

Celis, N., Casallas, A., López-Barrera, E.A., Felician, M., Marchi, M.D., & Pappalardo, S.E. (2023). Climate change, forest fires, and territorial dynamics in the Amazon rainforest: An integrated analysis for mitigation strategies. ISPRS International Journal of Geo-Information, 12(10), 436.

Creswell, J.W., & Creswell, J.D. (2022). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). SAGE Publications.

Cosma, G. (2024). From theory to practice: The importance of fire engineering education in today's world. Jensen Hughes. https://www.jensenhughes.com/europe/insights

Climate Adaptation Science Centers. (2021). Cycles of renewal: Returning good fire to the Chumash homelands. USGS. https://tinyurl.com/zv3uc3f9

D'Argonne, S. (2020). Anatomy of a wildfire: How fuel sources, weather and topography influence wildfire behavior. Summit Daily. https://tinyurl.com/528wx36r

Deci, E.L., & Ryan, R.M. (2000). The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11(4), 227–268.

Department of Environment and Natural Resources (DENR). (2024). Annual report of the enforcement division. DENR-CAR.

Department of Environment and Natural Resources (DENR). (n.d.). Forest fire prevention mitigation response and management: A manual.

Eslit, E. (2023). Empowering change at the grassroots: Community-led initiatives for local environmental protection. Preprints.org. https://doi.org/10.20944/preprints202307.1055.v1

Feng, X., Merow, C., Liu, Z., Park, D.S., Roehrdanz, P.R., Maitner, B., & Enquist, B.J. (2021). How deregulation, drought and increasing fire impact Amazonian biodiversity. Nature, 597(7877), 516–521.

Ferrer, L.J., De Torres, M., & Vargas, D. (2021). Communication strategies and disaster risk reduction management. Available at SSRN 3791093.

Glicksman, R.L., & Wentz, J. (2023). Irreconcilable differences or comfortably compatible?: Adaptive management and environmental assessments. Environmental Law, 53(2), 123–145.

Guillermo, M. (2023). Perceptions on the implementation of the Philippine development plan in ensuring efficient governance. Open Journal of Leadership, 12(4), 375–399.

Hollmann, S., Regierer, B., Bechis, J., Tobin, L., & D'Elia, D. (2022). Ten simple rules on how to develop a stakeholder engagement plan. PLoS Computational Biology, 18(10), e1010520.

Hyland-Wood, B., Gardner, J., Leask, J., & Ecker, U. (2021). Toward effective government communication strategies in the era of COVID-19. Humanities and Social Sciences Communications, 8(1). https://doi.org/10.1057/s41599-020-00701-w

Kager, N., Sparr, J., & Grote, G. (2022). Looking for guidance? Five principles for leveraging tensions in corporate–startup collaboration. The Journal of Applied Behavioral Science, 58(4), 682–715.

Kreider, M., Higuera, P., Parks, S., Rice, W., White, N., & Larson, A. (2024). Fire suppression makes wildfires more severe and accentuates impacts of climate change and fuel accumulation. Nature Communications, 15(1), 2412.

Li, W.-C., Tseng, J.-M., & Huang, H.-S. (2022). Effectiveness of advanced fire prevention and emergency response training at nursing homes. International Journal of Environmental Research and Public Health, 19(20), 13185.

Liagre, L., Pettenella, D., Pra, A., Ortiz, F.C., Arguedas, A.G., & Chien, C.N. (2021). How can national forest funds catalyse the provision of ecosystem services? Lessons learned from Costa Rica, Vietnam, and Morocco. Ecosystem Services, 47, 101228.

Maclean, K., Hankins, D.L., Christianson, A.C., Oliveras, I., Bilbao, B.A., Costello, O., & Robinson, C.J. (2023). Revitalising Indigenous cultural fire practice: Benefits and partnerships. Trends in Ecology & Evolution, 38(10), 899–902.

Mahendra, A., King, R., Du, J., Dasgupta, A., Beard, V.A., Kallergis, A., & Schalch, K. (2021). "Seven transformations for more equitable and sustainable cities". World Resources Report, Towards a More Equal City. Washington, DC: World Resources Institute. https://doi.org/10.46830/wrirpt.19.00124

Magazzino, C., Cerulli, G., Shahzad, U., & Khan, S. (2023). The nexus between agricultural land use, urbanization, and greenhouse gas emissions: Novel implications from different stages of income levels. Atmospheric Pollution Research, 14(9), 101846. https://doi.org/10.1016/j.apr.2023.101846

Mulyasari, F., Harahap, A.K., Rio, A.O., Sule, R., & Kadir, W.G.A. (2021). Potentials of the public engagement strategy for public acceptance and social license to operate: Case study of Carbon Capture, Utilisation, and Storage *Gundih* Pilot Project in Indonesia. International Journal of Greenhouse Gas Control, 108, 103312. https://doi.org/10.1016/j.ijggc.2021.103312

National Park Service. (2023). Wildland fire behavior. https://www.nps.gov/articles/wildland-fire-behavior. htm

Nizmi, Y.E., Olivia, Y., Retnaningsih, U.O., Saeri, M., Jama'an, A., & Alfajri, A. (2021). The peatland restoration agency's economic revitalization program in achieving the transboundary haze-free ASEAN 2020 in Riau Province. BERUMPUN: International Journal of Social, Politics, and Humanities, 4(2), 167–183.

Noviana, E., Kurniaman, O., Guslinda, Munjiatun, Zufriady, Z., & Dewi, R.S. (2020). Identification of knowledge mitigation of forest and land fire disasters; A preliminary study for management of disaster learning in elementary school. Journal of Physics Conference Series, 1655(1), 12097. https://doi.org/10.1088/1742-6596/1655/1/012097

Ostrom, E. (1990). Governing the commons: The evolution of institutions for collective action. Cambridge University Press.

Pogeyed, M.L. (1998). Philippines: No Fire Bonus Plan program of Mountain Province. International Forest Fire News No. 18, 52-56.

Ranjithkumar, A. (2025). Assessing the impact of agricultural land reduction on future global food security: Challenges and sustainable solutions. Indian Journal of Natural Sciences, 15(88).

Ryan, B., Johnston, K.A., Taylor, M., & McAndrew, R. (2020). Community engagement for disaster preparedness: A systematic literature review. International Journal of Disaster Risk Reduction, 49, 101655.

Sharma, S., & Dhakal, K. (2021). Boots on the ground and eyes in the sky: A perspective on estimating fire danger from soil moisture content. Fire, 4(3), 45. https://doi.org/10.3390/fire4030045

Sharpe, L., Harwell, M., & Jackson, C. (2021). Integrated stakeholder prioritization criteria for environmental management. Journal of Environmental Management, 282, 111719. https://doi.org/10.1016/j.jenvman.2020.111719

Stolte, D. (2021). Study shows impacts of deforestation and forest burning on Amazon biodiversity. University of Arizona. https://news.arizona.edu/news/

Synolakis, C.E., & Karagiannis, G.M. (2024). Wildfire risk management in the era of climate change. PNAS Nexus, 3(5), pgae151.

Thapa, S.B., Jenkins, J.S., & Westerling, A.L. (2023). Perceptions of wildfire management practices in a California wildland-urban interface. Environmental Advances, 12, 100382.

Turin, T.C., Kazi, M., Rumana, N., Lasker, M.A., & Chowdhury, N. (2023). Conceptualising community engagement as an infinite game implemented through finite games of 'research', 'community organising' and 'knowledge mobilisation'. Health Expectations, 26(5), 1799-1805. https://doi.org/10.1111/hex.13801

United Nations. (n.d.). Sustainable Development Goals. https://sdgs.un.org/goals

Williams, N.J., Candon, M., Stewart, R.E., Byeon, Y.V., Bewtra, M., Buttenheim, A.M., Zentgraf, K., Comeau, C., Shoyinka, S., & Beidas, R.S. (2021). Community stakeholder preferences for evidence-based practice implementation strategies in behavioral health: A best-worst scaling choice experiment. BMC Psychiatry, 21(1).

Yuliarti, A., & Ariyani, E. (2023). Information media as a public communication in fire mitigation in South Kalimantan. MetaCommunication: Journal of Communication Studies, 8(1), 59–70.