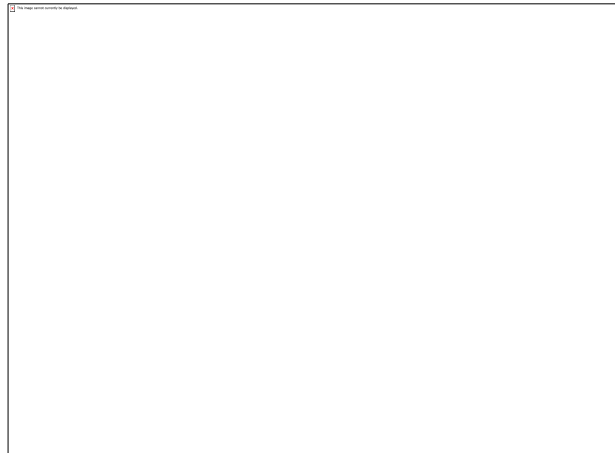


BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF NATURAL RESOURCES

**KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDS VELD FIRE
MANAGEMENT IN MARONDERA DISTRICT: A CASE OF WARD 3.**



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***A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE
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IN NATURAL RESOURCES MANAGEMENT.***

DATE: 30 MAY 2025

DEDICATION

I dedicate this dissertation to my dad, my pillar of strength. To my dad for instilling in me the value of education and inspired me to pursue knowledge with integrity.

DECLARATION

I Mutukwa Evercaring, declare that this research project is my work and has not been submitted to any other institution for academic purposes. I have followed the guidelines and regulations of Bindura University of Science Education and have obtained the necessary approvals.

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I would like to thank the Almighty for granting me the opportunity to take this step towards fulfilling my dreams. I want to thank my father (my number one fan) for his financial support and inspiring me to keep pushing. Also, I would like to extend my acknowledgement to my mother, my brothers and my sisters for their prayers and encouragement during this study.

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ABSTRACT

This study explored the Knowledge, Attitudes, and Practices (KAP) of local communities toward veldfire management in Ward 3 of Marondera District. In Zimbabwe, veld-fires are a significant environmental concern, contributing to deforestation, biodiversity loss, soil degradation, and air pollution, veld-fires devastate agricultural lands, destroy infrastructure, and disrupt livelihoods, particularly for rural communities who are heavily reliant on natural resources. Data collected using a mixed-methods approach involving questionnaires, interviews, and field observations. A total of 105 valid responses were collected, resulting in a 70% response rate. The study found that community knowledge was **fair** (62.5%), attitudes were generally **positive** (75%), but practices were **moderate/lagging** (52%). Correlation analysis revealed a significant link between knowledge and attitudes ($r = 0.45$, $p < 0.01$), while attitudes showed a weaker correlation with practices ($r = 0.28$, $p < 0.05$). However, no significant correlation was found between knowledge and practices. The results suggest that awareness alone is insufficient to improve veldfire management practices; instead, targeted educational programs, resource support, and capacity-building efforts are needed to bridge the gap between knowledge and action.

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LIST OF ACRONYMS AND ABBREVIATIONS

EMA	-	Environmental Management Agency
EMAct	-	Environmental Management Act
KAP	-	Knowledge, Attitude and Practices
NGO's	-	Non-Governmental Organizations
MRDC	-	Marondera Rural District Council

CHAPTER 1

INTRODUCTION

1.1 Background to the Study

Of all the global environmental issues, poor veld fire management has become a concern not only in ecologically sensitive regions but also in areas where human-environment interactions are prominent (FAO, The State of Food and Agriculture 2007: Paying Farmers for Environmental Services, 2007). Veld-fires, also known as wildfires or bush-fires, are a recurring environmental hazard globally, and Zimbabwe is particularly vulnerable due to its climate, vegetation types, and land use practices (EMA, Scientific Baseline Report on the Impact of Utilizing Wetlands in Zimbabwe, 2018).

In Zimbabwe, veld-fires are a significant environmental concern, contributing to deforestation, biodiversity loss, soil degradation, and air pollution (EMA, Veldfires: A Threat to the Environment, 2018). Economically, veld-fires devastate agricultural lands, destroy infrastructure, and disrupt livelihoods, particularly for rural communities who are heavily reliant on natural resources (ZIMSTAT, Census 2002: Zimbabwe: Preliminary Report, 2002). The impacts extend beyond immediate destruction, contributing to long-term food insecurity and hindering sustainable development goals.

Marondera District, located in Mashonaland East Province, Zimbabwe, is characterized by a mix of agricultural activities, woodlands, and communal lands, making it susceptible to veld-fires, particularly during the dry season (June to October). Ward 3, within Marondera District, is predominantly a rural ward with a significant reliance on agriculture and natural resources for livelihoods. Existing literature and reports suggest that Marondera District experiences recurrent veld-fire incidents annually, impacting both the environment and the socio-economic well-being of its communities (EMA, Marondera Rural District Council Master Plan (2024-2034), 2023).

The practice of effective veld-fire management will help minimize environmental degradation, protect livelihoods, and reduce socio-economic losses associated with these disasters (Alexander, 2013). Other studies also point out the importance of

community participation in veld-fire management in attaining the objectives of environmental sustainability and minimizing the vulnerability of communities to fire hazards (Makunde, 2019)

Participation of local residents in veld-fire management will not only help solve the fire problem but will provide a sense of ownership and responsibility within the community (Christianson, 2012) Studies carried out in developing nations have shown that even though awareness is growing, and general attitudes towards environmental protection are becoming positive, actual practices on the ground may still be lagging (Ali Akbar Babaei, 2015) This means that there is a gap between knowledge and practice in as far as veld-fire management is concerned in developing nations, and Zimbabwe is no exception.

This research study therefore seeks to fill this gap using Ward 3 in Marondera District as a case study, given the existing veld-fire challenges in this agro-ecological zone. Furthermore, this study also seeks to equip stakeholders at the community level with knowledge of the roles they can play in veld-fire management, influence their attitudes towards proactive fire prevention and control, and foster positive practices that are of benefit to the environment and their livelihoods.

1.2 Problem Statement

Veld-fires persist as a significant environmental and socio-economic problem in Marondera District, Ward 3, notwithstanding national policies and local initiatives aimed at their management. Annual veld-fire seasons continue to result in the destruction of valuable resources and livelihoods. Little is known about the knowledge, attitudes, and practices of the communities who are most directly affected by veld-fires at the household and community level within Ward 3, in relation to veld-fire management.

1.3 Justification

According to the Environmental Management Agency and the Forestry Commission, a significant proportion of veld-fires are preventable through proactive management strategies, including community-based approaches and informed practices at the local level (EMA, Know Your Role in Veldfire Management, 2018); (Forestry Commission, 2020) It is estimated that a substantial reduction in veld-fire incidents and their impacts

could be achieved through enhanced community knowledge, positive attitudes, and effective practices towards fire prevention and control. One can note that despite resource constraints faced by government agencies in effectively managing veld-fires across vast areas, community-led veld-fire management initiatives, informed by local KAP, can significantly augment national efforts and ensure more sustainable and localized solutions.

This study will foster stakeholder participation in veld-fire management, aiming to reduce the occurrence and severity of veld-fires and their associated negative consequences. Through collaborative efforts, a system whereby communities are empowered to proactively manage veld-fire risks and protect their resources can be developed, thus promoting community resilience and environmental sustainability. Moreover, by addressing the human dimension of veld-fire management through KAP, the negative impacts of these hazards on the environment and human well-being can be substantially reduced, giving nature and communities the ability to thrive and ensure sustainable development.

1.4. Aim

To investigate the knowledge, attitudes, and practices of communities in Ward 3, Marondera District, towards veld-fire management.

1.5 Objectives

- To assess the knowledge on veld-fire causes, impacts, and prevention methods in Ward 3 Marondera District.
- To evaluate community attitudes towards veld-fire management, including their perceptions of risk and responsibility.
- To determine respondents' practices on veld-fire prevention, preparedness, and control.
- To relate knowledge, attitudes, and practices towards veld-fire management to socio-demographic variables.

1.6 Research Questions

- What is the respondents' knowledge on veld-fire causes, impacts, and prevention methods?
- What are the respondents' attitudes towards veld-fire management, including their perceptions of risk and responsibility?

- Which practices are respondents undertaking towards veld-fire prevention, preparedness, and control?
- How is knowledge, attitude, and practice related to socio-demographic variables in the context of veld-fire management?

CHAPTER 2

LITERATURE REVIEW

2.0 DEFINITIONS AND CONCEPTUAL FRAMEWORK

2.1 Veld-Fires: A Multifaceted Definition

Veld-fires, encompassing wildfires, bush-fires, and forest fires, are defined as uncontrolled conflagrations occurring in wild land vegetation, spanning diverse ecosystems from grasslands and savannas to woodlands and dense forests (FAO, Wildland Fire Management Terminology, 2010). These are not isolated incidents but rather a recurrent global environmental phenomenon, with regions like Zimbabwe facing heightened susceptibility due to a complex interplay of climatic, ecological, and anthropogenic (EMA, Veldfires: A Threat to the Environment, 2018). It is crucial to move beyond a simplistic view of veld-fires as mere destructive events and recognize their multifaceted nature. Veld-fires are both a natural ecological process, integral to the dynamics of many biomes, and a potential hazard, particularly when human activities disrupt natural fire regimes or exacerbate fire risk (Alexander, 2013).

2.1.1 The Knowledge, Attitudes, And Practices (Kap) Framework

This dissertation leverages the Knowledge, Attitudes, and Practices (KAP) framework as its central analytical lens to investigate community-level responses to veld-fire management. The KAP framework, a cornerstone of social science research, particularly in public health, environmental studies, and development interventions, offers a structured methodology for examining the intricate relationships between human cognition, affect, and behavior in relation to a specific issue or challenge (Banga, 2013); (Debasish Kumar Kundu, 2020). Its strength lies in its ability to provide a nuanced understanding of the factors that drive or hinder behavior change, making it a valuable tool for designing targeted and effective interventions (Michie, 2011).

In the context of veld-fire management, the KAP framework enables a systematic assessment of community perspectives across three interconnected dimensions i.e Knowledge, Attitudes and Practices. Knowledge assesses the depth and breadth of community understanding regarding veld-fires. It explores awareness of veld-fires causes (both natural and anthropogenic), ecological and socio-economic impacts (both

positive and negative), and the range of prevention and control methods available, encompassing both scientific and indigenous knowledge systems relevant to fire management (EMA, Know Your Role in Veldfire Management, 2018). Understanding existing knowledge levels is crucial for identifying knowledge gaps and tailoring effective educational interventions (FAO 2. , 2010)

Attitudes examine into the affective domain, examining community perceptions, beliefs, values, and emotional responses towards veld-fires and fire management (Goudie, 2010)It encompasses risk perception (how communities perceive the threat and likelihood of veldt fires impacting them), responsibility attribution (who communities believe is accountable for veldt fire management – individuals, government, or collective responsibility), and overall disposition towards specific management strategies (positive, negative, or ambivalent). Attitudes are critical mediators in the translation of knowledge into action; positive attitudes towards veld-fire prevention are essential for fostering community engagement and support for management initiatives (Fleischman, 2014)

Practices focus on the tangible behaviors and actions undertaken by community members in relation to veld-fire management (Eriksen, 2014)It encompasses both proactive prevention practices (e.g., firebreak construction, fuel load reduction, participation in early burning initiatives) and reactive response practices (e.g., firefighting efforts, evacuation procedures, post-fire recovery actions). Analyzing existing practices allows for the identification of effective behaviors to reinforce, as well as mal-adaptive practices or behavioral gaps that need to be addressed through targeted interventions and capacity building (Mohr, 2011)

The KAP framework's application in this study is further justified by its demonstrated effectiveness in similar contexts, such as natural disaster preparedness (Kouadio, 2010)climate change adaptation (UNESCO, 2010)and sustainable resource management. By systematically investigating community KAP, this research aims to provide a robust evidence base for designing tailored veld-fire management interventions that are both effective and culturally appropriate, as highlighted in the Rationale and Significance section of Chapter 1.

2.2 CAUSES OF VELD-FIRES

2.2.1 The Overwhelming Influence of Anthropogenic Factors

While acknowledging the role of natural phenomena like lightning strikes as potential ignition sources, particularly in specific biomes such as boreal forests (Potgieter, 2000) the scientific literature overwhelmingly points to human activities as the primary drivers of veld-fire ignitions globally, especially in fire-prone savanna and grassland ecosystems like Zimbabwe ((Ronde, 2004); (Siwele N. S., 2011); (WWF, 2001) Global studies estimate that anthropogenic ignitions account for over 95% of wildfires, underscoring the critical importance of addressing human behavior and land management practices in veld-fire mitigation strategies ((Pyn01); (Jon E. Keeley, William J. Bond, Bradstock, Pausas, & Rundel, 2012)

2.2.2 Specific Human – Induced Ignition Pathways in Zimbabwe

Within Zimbabwe, a diverse range of human activities, both intentional and unintentional, contribute to veld-fire ignitions. These include land management and bad agricultural practices, hunting and honey harvesting, negligence and accidental ignitions, arson and deliberate fire setting.

Traditional agricultural practices, particularly slash-and-burn agriculture, remain a significant ignition source when uncontrolled or improperly managed (E. Svatwa, 2007) While these practices have historical roots, their continued use in contemporary landscapes, often coupled with increased population density and land-use intensification, elevates veld-fire risk. Similarly, agricultural activities like burning crop residues or pasture improvement, if not carefully planned and executed, can easily escape control and trigger larger wildfires. Hunting practices, particularly the use of fire to flush out game or manipulate animal movement, are deeply ingrained in some rural communities and contribute significantly to wildfire ignitions, especially during the dry season when vegetation is highly flammable. Honey harvesting, another important livelihood activity, often involves smoking out beehives, which, if not handled with extreme caution, can lead to unintended ignitions, especially in dry vegetation (George Nyamadzawo, 2013)

Human negligence and accidental ignitions are pervasive causes of veld-fires, encompassing a wide range of activities. Careless disposal of lit cigarettes, matches, or

embers from campfires, unattended cooking fires, and malfunctioning equipment (e.g., vehicles, machinery) are common sources of accidental ignitions (WWF, 2001). Power lines, fireworks, and even glass fragments focusing sunlight can also trigger accidental fires under dry conditions. The deliberate and malicious setting of fires, while less frequent than accidental ignitions, can contribute to significant veld-fire damage, particularly in areas with socio-economic grievances or land-use conflicts (George Nyamadzawo, 2013). Motivations for arson can range from land tenure disputes and labor conflicts to acts of vandalism or pyromania. Understanding the underlying socio-economic drivers of arson is crucial for developing targeted prevention strategies.

2.2.3 Socio-Economic and Contextual Drivers of Fire Risks

A comprehensive understanding of veld-fire causes necessitates examining the broader socio-economic and contextual factors that shape human behavior and land management practices. Poverty, for instance, can constrain access to alternative land clearing methods, making fire the most readily available and cost-effective, though inherently risky, option (Goldammer, 2010). Economic hardship can also drive increased reliance on natural resources, intensifying activities like hunting, firewood collection, and non-timber forest product harvesting, all of which can elevate fire risk if not managed sustainably.

Land tenure insecurity and ambiguous property rights can disincentivize investment in fire prevention measures, as communities may lack a sense of ownership or long-term stake in the land and its resources. Cultural norms and traditional practices, while potentially containing valuable ecological knowledge about fire use, can also inadvertently contribute to veld-fire risk if not adapted to evolving environmental conditions, population growth, and land-use pressures (Laris, 2002)

2.2.4 Climate Change and Fuel Load: Amplifying Fire Regimes

While human activities are the primary ignition agents, climate change and fuel load play a crucial role in modulating veld-fire behavior, spread, and intensity, exacerbating fire regimes in many regions, including Zimbabwe (Ronde, 2004); (IPCC, 2021). Climate change projections for Southern Africa indicate increased temperatures, prolonged dry seasons, more frequent droughts, and altered rainfall patterns, creating increasingly fire-prone conditions (Mike Hulme et al., 2001). These climatic shifts lead

to drier vegetation, extended fire seasons, and heightened landscape flammability, increasing both the likelihood of ignition and the potential for rapid fire spread (Mike D. Flannigan et al., 2009).

Fuel load, the quantity and type of combustible vegetation available, is a critical determinant of fire intensity and behavior (Pyn01) Accumulation of dry grasses, shrubs, leaf litter, and woody debris, particularly following periods of abundant rainfall promoting vegetation growth followed by prolonged drought and drying, creates a substantial fuel load, significantly increasing the risk of large, intense, and uncontrollable veld-fires (Ross A. Bradstock et al., 2012)

2.3 IMPACTS OF VELD-FIRES

2.3.1 Environmental Degradation: Undermining Ecological Integrity

Veld-fires unleash a cascade of detrimental environmental impacts, undermining the ecological integrity and resilience of fire-prone ecosystems (EMA, Know Your Role in Veldfire Management, 2018). Deforestation, a direct and visible consequence, results from the consumption of trees and woodlands by fire, leading to long-term habitat loss, fragmentation of forest landscapes, and diminished carbon sequestration capacity, contributing to climate change. Biodiversity loss, a less visible but equally critical impact, stems from fire-induced mortality of plants and animals, disturbances of ecological processes (e.g., nutrient cycling, pollination), and the selective advantage conferred upon fire-tolerant species, potentially leading to shifts in ecosystem composition and function and a decline in overall species richness and functional diversity (Bond, 2005).

Soil degradation, often overlooked in immediate post-fire assessments, is a significant long-term environmental consequence. Veld-fires can strip away protective vegetation cover, exposing the land to loss from wind and rain, resulting in topsoil loss, nutrient depletion, reduced soil fertility, and overall land degradation, impacting long-term ecosystem productivity and resilience. Water resources are also negatively impacted, as veld-fires can lead to increased runoff, soil erosion, and sedimentation of water bodies, degrading water quality and impacting aquatic ecosystems. Air pollution, a more immediate and visible impact, arises from the release of smoke, particulate matter,

and greenhouse gases during veld-fire combustion, contributing to regional and global air quality degradation and climate change.

2.3.2 Socio-Economic Hardships: Erosion of Livelihoods and Increased Vulnerability

The socio-economic impacts of veld-fires are far-reaching and often devastating, disproportionately affecting vulnerable rural communities whose livelihoods are intricately linked to natural resources. Agricultural losses constitute a primary concern, as veld-fires destroy standing crops, grazing lands, livestock, stored harvests, and essential agricultural infrastructure such as barns, fences, and irrigation systems, leading to immediate economic losses, reduced agricultural productivity, and heightened food insecurity, particularly in subsistence-based farming systems (ZIMSTAT, Environmental Statistics Related to Veld Fire, 2022). Damage to property extends beyond agricultural assets, encompassing homes, infrastructure (roads, power lines, communication networks), and personal belongings, further exacerbating economic vulnerability and disrupting essential services and daily life in affected communities. Veld-fires can also disrupt economic activities beyond agriculture, hindering development progress and diverting scarce resources towards emergency response, relief efforts, and long-term recovery, impeding sustainable development trajectories in affected regions. The tourism sector, a significant source of revenue and employment in Zimbabwe, can suffer considerable economic losses from veld-fire damage to scenic landscapes, wildlife habitats, and tourism infrastructure, coupled with decreased tourist arrivals due to smoke haze and perceived safety risks.

2.3.3 Human Health Crisis: A Spectrum of Health Impacts

Veld-fires pose both acute and chronic threats to human health, impacting both physical and mental well-being. Direct exposure to flames and radiant heat can cause severe burns, injuries, and fatalities, particularly for vulnerable populations such as children, the elderly, and individuals with mobility impairments. Smoke inhalation, a pervasive and widespread health hazard associated with veld-fires, leads to a range of respiratory illnesses, including asthma exacerbation, bronchitis, pneumonia, and reduced lung function, particularly affecting individuals with pre-existing respiratory conditions and children (EMA, Scientific Baseline Report on the Impact of Utilizing Wetlands in Zimbabwe, 2018). Prolonged exposure to wildfire smoke can also contribute to

cardiovascular problems, increased risk of heart attacks and strokes, and other systemic health effects (Fay H. Johnston et al., 2012)

Air pollution from veld-fires extends beyond immediate smoke exposure, contributing to regional and even global air quality degradation, impacting public health far beyond the immediate fire zone (WHO, 2016). Fine particulate matter (PM_{2.5}) in wildfire smoke is a particularly hazardous air pollutant, penetrating deep into the lungs and bloodstream, contributing to a range of respiratory and cardiovascular health problems (Luke P. Naeher et al., 2007). Beyond physical health, veld-fires can also trigger significant psychological trauma and mental health challenges within affected communities. Experiencing or witnessing a veld-fire, particularly when coupled with loss of homes, livelihoods, or loved ones, can lead to post-traumatic stress disorder (PTSD), anxiety disorders, depression, grief, and other mental health conditions that require long-term support and intervention.

2.4 VELDTFIRE MANAGEMENT STRATEGIES

2.4.1 Proactive Prevention: Averting Disaster Through Prevention

Effective veldt fire management hinges on a proactive approach that prioritizes prevention strategies aimed at minimizing ignition sources, reducing fuel hazards, and enhancing community preparedness before fires ignite. Prevention is not only more cost-effective than suppression but also more ecologically sound, minimizing the environmental and socio-economic impacts of veld-fires (Van Wilgen, 2010). Key prevention strategies include sustained and targeted public education campaigns are paramount for fostering a culture of fire safety and promoting responsible fire behavior. Educational initiatives should go beyond simply informing communities about veld-fire dangers and actively engage them in understanding their own roles and responsibilities in fire prevention. Effective campaigns should utilize diverse communication channels, including local media (radio, newspapers, community television), community meetings, schools, churches, and traditional leadership structures, tailoring messages to specific audiences and cultural contexts. Participatory approaches, involving community members in the design and delivery of education programs, can enhance message receptivity and promote community ownership.

Establishing and maintaining strategically located firebreaks is a cornerstone of veld-fire prevention. Firebreaks, acting as physical barriers, interrupt fuel continuity, slowing down or halting fire spread, protecting communities, infrastructure, and high-value ecosystems. Effective firebreak networks require careful planning, considering topography, vegetation types, and fire history, and regular maintenance to ensure their integrity and effectiveness. Fuel load management, encompassing a range of techniques to reduce the amount of combustible vegetation, is another critical prevention strategy. Prescribed burning, the controlled application of fire under specific weather conditions, can be a valuable tool for reducing fuel accumulation, mimicking natural fire regimes, and creating mosaic landscapes that are less prone to large, intense wildfires (Botelho, 2003). Mechanical fuel reduction methods, such as thinning vegetation or mowing grasses, can also be employed in strategic locations, particularly around communities and infrastructure. Sustainable grazing management, using livestock to graze down flammable vegetation, can also contribute to fuel load reduction in appropriate ecosystems.

Strengthening legal frameworks and consistent enforcement of veldfires regulations are essential for deterring arson, negligence, and other risky fire behaviors. Legislation should clearly define prohibited fire-related activities, establish appropriate penalties for violations, and empower law enforcement agencies to effectively monitor, investigate, and prosecute fire offenders. Community involvement in fire monitoring and reporting can also enhance law enforcement effectiveness.

Promoting Community-Based Fire Management (CBFiM) represents a paradigm shift in veld-fire management, emphasizing community empowerment, local ownership, and participatory approaches. CBFiM recognizes that local communities are not merely passive recipients of fire management interventions but rather active agents and stakeholders in the process. CBFiM initiatives build upon local knowledge, traditional fire management practices, community resources, and participatory decision-making processes to develop context-specific fire management plans that are tailored to local needs, values, and ecological conditions (L.A. Torell et al., 2003). CBFiM fosters a sense of ownership, enhances community capacity for fire management, and promotes long-term sustainability of fire prevention and control efforts.

2.4.2 Effective Suppression: Swift and Coordinated Response

Despite robust prevention efforts, veldt fires may still ignite, underscoring the critical importance of effective suppression and control strategies to minimize damage and protect lives and property. Rapid detection, early response, and well-trained and equipped firefighting teams are paramount for successful fire suppression. Key suppression strategies encompass establishing efficient and technologically advanced fire detection systems is crucial for early fire detection and rapid response. These systems may include aerial surveillance (fire-spotting aircraft, drones), satellite-based fire monitoring, remote sensing technologies, and community-based fire reporting networks (e.g., hotlines, mobile apps). Early warning systems, disseminating timely and accurate fire information to communities and fire response agencies, are essential for enabling proactive preparedness and evacuation measures.

Developing and maintaining rapid response fire suppression capabilities is essential to contain fires in their initial stages, before they escalate into large, uncontrollable wildfires. This requires well-trained and equipped firefighting teams, strategically located fire stations, and efficient mobilization and dispatch protocols. Initial attack strategies focus on rapidly deploying firefighting resources to suppress fires while they are still small and manageable, maximizing the effectiveness of suppression efforts and minimizing resource expenditure.

Direct attack methods involve firefighters directly engaging the fire front to extinguish flames using water, fire retardants (chemical agents that slow or suppress combustion), and physical barriers. This requires specialized firefighting equipment (fire trucks, water tankers, pumps, hoses, hand tools), protective gear for firefighters, and effective command and control structures. Indirect attack techniques which focus on containing fire spread by creating fire lines or barriers ahead of the fire front, removing fuel and interrupting fire progression. This may involve constructing firebreaks (using bulldozers, hand tools, or explosives), utilizing backfires (controlled burns set ahead of the main fire to consume fuel), or leveraging natural barriers such as rivers, roads, or rock outcrops.

2.4.3 Post-Fire Management and Ecological Restoration: Building Long-Term Resilience

Post-fire management is a critical phase in the veld-fire management cycle, focusing on assessing damage, supporting community recovery, and promoting long-term ecological restoration in fire-affected areas. Effective post-fire management strategies include conducting thorough and timely assessments of environmental, socio-economic, and infrastructure damage is essential for informing recovery and restoration planning. Damage assessments should quantify ecological losses (e.g., vegetation damage, biodiversity impacts, soil erosion), socio-economic losses (e.g., property damage, livelihood impacts, economic losses), and community needs (e.g., shelter, food, water, medical assistance, psychosocial support).

Providing immediate relief and humanitarian assistance to fire-affected communities is paramount, including emergency shelter, food, water, medical care, and psychosocial support to address immediate needs and alleviate suffering. Long-term recovery support, focusing on rebuilding homes, restoring livelihoods, and revitalizing community infrastructure, is equally crucial for enabling communities to recover and rebuild their lives and livelihoods in a sustainable manner.

Implementing ecological restoration and rehabilitation measures is essential for promoting the long-term recovery and resilience of fire-affected ecosystems. Restoration efforts may include seed dispersal of native species, planting seedlings of native trees and shrubs, erosion control measures (e.g., terracing, contour plowing, mulching), and habitat rehabilitation to enhance biodiversity and ecosystem function. Long-term monitoring and adaptive management are crucial for ensuring the success of ecological restoration efforts and promoting ecosystem resilience to future fire events.

2.5 Policy and Institutional Framework for Veld-Fire Management in Zimbabwe

Zimbabwe has established a comprehensive policy and institutional framework for veld fire management, primarily anchored in the Environmental Management Act, the Forest Act, and related legislation, reflecting a commitment to addressing veld-fire challenges at the national level. The EMA, as the designated lead agency, assumes a central coordinating role in veld-fire management, overseeing national policy formulation,

program implementation, and regulatory enforcement (EMA, Know Your Role in Veldfire Management, 2018). The Forestry Commission, mandated with forest protection and sustainable forest management, plays a crucial role in fire management within forest reserves and plantation areas. Local authorities, through municipal and rural district councils, are responsible for veld-fire management within their jurisdictions, including fire prevention, suppression, and community engagement. Traditional leaders, recognized under the Traditional Leaders Act, also play a significant role in local-level fire management, particularly in communal lands, through customary laws, traditional fire management practices, and community mobilization (EMA, Know Your Role in Veldfire Management, 2018)).

National policies and strategies articulate a commitment to integrated fire management approaches, community participation, multi-sectoral collaboration, and a balanced emphasis on prevention, preparedness, suppression, and post-fire recovery (Makunde, 2019). However, despite this robust framework, significant challenges persist in translating policy into effective action on the ground, hindering veld-fire management effectiveness, particularly in resource-constrained rural areas like Marondera District.

Key implementation and governance challenges included limited financial resources, inadequate firefighting equipment, insufficient personnel, and logistical challenges constrain the operational capacity of EMA, local authorities, and other fire management agencies, particularly in vast and remote rural areas. Underfunding of fire management programs, coupled with competing priorities and limited access to advanced technologies, hampers effective fire prevention, detection, and suppression efforts. Veld-fire legislation in Zimbabwe is comprehensive, enforcement remains weak and inconsistent, undermining the deterrent effect of regulations and contributing to low compliance levels. Challenges in identifying and prosecuting fire offenders, coupled with lenient penalties and protracted legal processes, weaken the effectiveness of law enforcement mechanisms. Furthermore, regulatory gaps or ambiguities in certain areas, such as land-use planning and fire risk zoning, may hinder proactive fire management efforts.

Effective veld-fire management requires seamless coordination and collaboration among diverse stakeholders, including government agencies (EMA, Forestry

Commission, local authorities), traditional leaders, community organizations, NGOs, and private sector entities. However, coordination gaps, institutional fragmentation, overlapping mandates, and limited communication among these actors often hinder integrated and synergistic fire management efforts. Strengthening inter-agency collaboration, establishing clear roles and responsibilities, and promoting effective communication channels are essential for enhancing fire management coordination and effectiveness. Despite policy rhetoric emphasizing community participation, meaningful community engagement and local ownership of veld-fire management remain limited in many areas. Top-down approaches, inadequate community consultation, limited capacity building initiatives, and insufficient integration of local knowledge and traditional practices hinder effective community involvement. Empowering communities to actively participate in decision-making, planning, implementation, and monitoring of fire management programs is crucial for fostering local ownership and ensuring long-term sustainability.

2.6 Research Gaps

Despite the existing body of literature on veld-fires, their causes, impacts, and management strategies, significant research gaps persist, particularly concerning the human dimension of veld-fire management in Zimbabwe, and specifically the critical role of community-level KAP. Limited Empirical Evidence on Localized KAP in Zimbabwe: A notable gap exists in empirical research specifically investigating the knowledge, attitudes, and practices of communities towards veld-fire management at the local level within Zimbabwe. While national-level policies and broad environmental assessments are available, in-depth, localized studies exploring community-specific perspectives, behaviors, and contextual factors influencing fire management are scarce. This research aims to address this gap by focusing on a case study in Ward 3, Marondera District.

Need for a development studies perspective much of the existing research on veld-fires in Zimbabwe adopts an environmental science, forestry, or disaster management perspective, often focusing on ecological impacts or technical management solutions. This dissertation seeks to contribute a Development Studies perspective, explicitly linking veld-fire management to broader development challenges, community

livelihoods, poverty reduction, social justice, and sustainable development goals, highlighting the human dimensions of fire risk and vulnerability.

While literature offers general recommendations for veld-fire management, there is a dearth of practical, context-specific, and actionable recommendations that can be directly implemented by local authorities, community organizations, and development practitioners to improve veld-fire management on the ground. This research aims to bridge this gap by generating evidence-based recommendations tailored to the specific socio-ecological context of Ward 3, Marondera District, informed by community KAP assessments. The influence of socio-cultural factors, traditional knowledge systems, and indigenous practices on veld-fire management in Zimbabwe remains under-explored in existing research. This dissertation seeks to delve into these nuanced contextual dimensions, investigating how local cultural norms, beliefs, social structures, and indigenous fire management practices shape community KAP and can be leveraged for more effective and culturally appropriate veld-fire management strategies.

CHAPTER 3

METHODOLOGY

3. 0 Description of the Study Area

Ward 3 is situated in Marondera District, located within Mashonaland East Province in Zimbabwe. The district lies approximately 80 km east of Harare, the capital city, and is characterized by a mixture of communal and commercial farming activities. Ward 3, specifically, is a predominantly rural area with scattered settlements, open woodlands, and cultivated land.

The geographical coordinates of Marondera District range from 17°50'S to 18°30'S latitude and 31°30'E to 32°00'E longitude (Environmental Management Agency [EMA], 2018). The region is part of Zimbabwe's agro-ecological region II, which receives 750–1,000 mm of rainfall annually, making it relatively well-watered compared to semi-arid parts of the country. However, seasonal dry spells and droughts contribute to the high risk of veld-fires in the area.

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Figure 1: Marondera district wards and the study area highlighted.

3.1.2 Climate and Vegetation

The climate of Ward 3 is subtropical, with distinct wet and dry seasons. The wet season occurs between November and April, while the dry season spans from May to October. During the peak dry season (August to October), vegetation becomes highly flammable, increasing the likelihood of veld-fires (Chikandiwa, 2020). Vegetation in Ward 3 includes a combination of miombo woodlands, open savanna, and grasslands, with common tree species such as *Brachystegia spiciformis* (msasa) and *Julbernardia globiflora* (mnondo). These ecosystems are essential for biodiversity but are highly susceptible to fire outbreaks, especially when subjected to human activities such as slash-and-burn agriculture, charcoal production, and illegal land clearing (Forestry Commission, 2020)

3.1.3 Socio-Economic Activities

The primary economic activities in Ward 3 include subsistence farming, livestock rearing, and informal trading. The majority of residents engage in maize, tobacco, and horticultural production, relying heavily on natural resources for their livelihoods (ZIMSTAT, Environmental Statistics Related to Veld Fire, 2022). Given the high

dependence on land-based activities, veld-fires pose a significant threat to food security, livestock grazing areas, and rural incomes. Uncontrolled fires in Ward 3 have resulted in the loss of grazing pastures, destruction of crops, and depletion of soil fertility. Local residents often use fire as a land management tool, but improper fire management practices lead to extensive environmental degradation (EMA, 2021). The recurrent nature of veld-fires in Marondera District highlights the urgent need for improved fire management strategies, community awareness programs, and enforcement of fire prevention regulations.

3.1.4 Veld-Fire Challenges in Ward 3

Veld-fires in Ward 3 are primarily caused by a combination of human activities and natural factors. The key drivers include poor agricultural practices whereby farmers clear land using fire, but uncontrolled burning leads to runaway fires. Illegal poaching and honey harvesting is also a challenge due to fire being used to flush out wildlife or smoke out beehives, but it often spreads uncontrollably. Dry weather conditions, prolonged dry seasons, combined with high temperatures, create ideal conditions for wildfires. Weak Enforcement of fire regulations is also a challenge despite national fire prevention policies, monitoring and enforcement remain weak, leading to increased fire incidents (Makunde, 2019).

3.2 Data Collection Methods

A mixed-methods approach was adopted to capture a comprehensive picture of community knowledge, attitudes, and practices (KAP) regarding veld-fire management. This strategy was selected because it allows us to quantify key indicators via structured surveys while also exploring deeper contextual insights through qualitative techniques. The triangulation of data from primary and secondary sources ensures that both the breadth and depth of community perspectives are obtained, thereby enhancing the validity of our conclusions (Clark, 2018).

3.2.1 Structured Questionnaires

Structured questionnaires were developed based on established survey instruments and tailored to the local context of Ward 3. A stratified random sample of households was drawn to ensure that various demographic segments (e.g. age, gender, education) were adequately represented. Items captured age, gender, educational attainment, income, and length of residency, enabling subsequent analysis of how these variables influence KAP. A series of closed-ended questions, including multiple-choice and Likert-scaled

items, were designed to assess respondents' awareness of veld-fire causes, impacts, and management practices. Questions were piloted with a small group of local residents to ensure clarity and cultural relevance (EMA, 2021); (ZIMSTAT, Environmental Statistics Related to Veld Fire, 2022) Items measuring attitudes were phrased to capture levels of concern, perceived risk, and willingness to participate in preventive actions. Practice items inquired about the actual steps taken by households (e.g. creating firebreaks, community meetings).'

3.2.2 Semi- Structured Interviews

Semi-structured interviews were conducted with key informants selected from community leadership, local fire management officials, and representatives of the Environmental Management Agency. Interview protocols were designed with open-ended questions that allowed interviewees to elaborate on their personal experiences, challenges, and perceptions regarding veld-fire management. The flexibility of the semi-structured format enabled interviewers to probe deeper when necessary while still maintaining a common structure across interviews. This method was particularly effective in uncovering contextual factors and local nuances that might not be captured through standardized questionnaires (Kawulich, 2012).

3.2.3 Secondary Data Sources

Secondary data were gathered from a range of existing sources to complement and validate primary data. These includes reports from the Environmental Management Agency provided insights into governmental strategies and historical trends in veld-fire occurrences, recent data from the Zimbabwe National Statistics Agency (ZIMSTAT, Environmental Statistics Related to Veld Fire, 2022)) offered demographic and socio-economic context that helped benchmark and contextualize our primary findings. A review of prior studies on community-based fire management and KAP in similar contexts provided a theoretical framework and allowed for comparison with our results.

3.3 Data Analysis Methods

Data analysis was conducted using a combination of quantitative and qualitative techniques, ensuring that findings from the structured questionnaires, interviews, and focus groups were rigorously examined and integrated to provide a robust interpretation of community KAP.

3.3.1 Quantitative Analysis

Data obtained from structured questionnaires was coded and entered into statistical software for analysis. The analysis process included frequencies, percentages, means, and standard deviations were computed to summarize respondents' demographic profiles and to assess overall levels of knowledge, attitudes, and practices. Chi-square tests were used to analyze categorical data and to assess associations between socio-demographic variables and KAP indicators. Correlation analyses helped identify linear relationships between knowledge scores and reported practices. Additionally, regression analyses were conducted to determine predictors of positive fire management practices, with significance assessed at the 95% confidence level (ZIMSTAT, Environmental Statistics Related to Veld Fire, 2022). The quantitative analysis allowed us to statistically validate the hypothesis that higher levels of knowledge and more favorable attitudes are associated with improved practices in veld-fire management.

3.3.2 Qualitative Analysis

Qualitative data from semi-structured interviews and focus group discussions were transcribed verbatim and analyzed using a thematic analysis approach. An initial coding framework was developed based on the research objectives and refined iteratively through independent coding of a subset of transcripts. Codes were grouped into broader themes that captured common perceptions, barriers, and suggestions related to veld-fire management. NVivo software was utilized to organize, categorize, and analyze the qualitative data. This software enabled systematic coding and facilitated the comparison of themes across different respondent groups.

3.3.3 Triangulation

To enhance the credibility of our findings, a triangulation strategy was employed. Quantitative and qualitative findings were compared and integrated to identify converging patterns as well as discrepancies. For instance, the statistical association between high knowledge scores and proactive fire management practices was enriched by qualitative insights explaining how local experiences and historical fire events shaped respondents' behaviors. This cross-validation process helped to ensure that our interpretation of community KAP was both comprehensive and context-specific (Baum, 2006)

3.4 Response Rate

In this study the response rate is defined as the percentage of completed questionnaires returned out of the total number distributed, after accounting for ineligible cases. We followed one of the standard definitions provided by the American Association for Public Opinion Research (AAPOR, 2008). Our calculation employed an intention-to-treat approach, where every distributed survey in the target sample was considered in the denominator, ensuring transparency and reducing the risk of inflating our response metrics. A range of proactive strategies was implemented to maximize participation, this included personalized correspondence has been shown to enhance the likelihood of response by reducing the perception of anonymity and encouraging a sense of individual responsibility (Michael D. Kaplowitz, 2004). In this study, invitations were tailored to include the recipient's name and localized content that underscored the survey's relevance to their community. Prepaid incentives have been demonstrated to improve response rates more effectively than conditional rewards (Ye, 2013). The incentive not only rewarded the respondents for their time but also signaled the survey's value to the community. Timely follow-up communications were dispatched to non-responders. Multiple contacts (up to three reminder waves) were found in the literature to significantly increase response rates by reducing forgetfulness and demonstrating persistence (Edwards, 2009) Our approach was carefully scheduled so as not to burden recipients while ensuring that the survey remained top-of-mind.

Through the combined effect of these strategies, this study achieved a response rate of approximately 70%. This figure is well above the average rates reported in similar environmental and community-based surveys (AAPOR, 2008); (Scott Keeter, 2006)). A high response rate is critical because it minimizes the potential for nonresponse bias – a concern when certain demographic or socio-economic groups are underrepresented in the final sample. Although some degree of nonresponse bias is inevitable in survey research, our extensive follow-up and incentive strategies help ensure that the resulting dataset is broadly representative of the target population.

3.5 Strengths

Integrating quantitative data from structured questionnaires with qualitative insights derived from semi-structured interviews and focus group discussions, the study is able to capture both the breadth and depth of community perspectives. Focusing on Ward

3, a region particularly affected by veld-fire incidents, provides in-depth insight into local environmental and socio-economic dynamics. This focus allows for tailored recommendations that are directly relevant to the community's needs, enhancing the practical application of our research findings (EMA, Know Your Role in Veldfire Management, 2018)

This study employed best practices in survey design, including personalized invitations, pre-paid incentives, and strategically timed follow-up reminders, which together contributed to a higher response rate and minimized nonresponse bias. Our dual-mode administration (both paper-based and online) ensured broader accessibility and inclusivity among diverse demographic groups, further enhancing representativeness (Michael D. Kaplowitz, 2004).

Quantitative responses were subjected to both descriptive and inferential statistical analyses, while qualitative data underwent thorough thematic coding using NVivo software. This multi-pronged analytical approach enhances the reliability of our findings and ensures that subtle nuances in community perceptions are captured and interpreted accurately (Clark, 2018). Adhering to established ethical protocols, all data were anonymized, and informed consent was obtained from every participant. This rigorous ethical framework not only protects respondent privacy but also bolsters the credibility of the research process.

Collectively, these strengths ensure that this study not only provides statistically robust and generalizable findings but also generates actionable insights for local policy makers and stakeholders seeking to improve veld-fire management practices. By leveraging a comprehensive, context-sensitive approach, this study significantly contributes to both academic literature and practical environmental management strategies.

3.6 Limitations

Some of the respondents expected cash or kind in return for their time.

CHAPTER 4

RESULTS

4.1 Response Rate

A mixed-methods approach necessitated robust data collection across quantitative and qualitative domains. For the survey component, [150] questionnaires were distributed across the stratified random sample of households in Ward 3. A total of [105] questionnaires were successfully collected and deemed valid for analysis, representing a final response rate of 70%. This robust response rate is considered sufficient for meaningful statistical analysis and minimizes the potential impact of non-response bias, ensuring the findings provide a reasonably representative snapshot of the community within Ward 3 (AAPOR, 2008). Qualitative data saturation was achieved through interviews with 5 key informants.

4.2 Demographic Profile of Respondents

A clear understanding of the respondents' backgrounds is essential for interpreting the KAP findings within the specific context of Ward 3. Table 4.1 provides a detailed breakdown of the key socio-demographic characteristics of the 105 questionnaire participants.

Table 1: Demographic Variables of Participants (N=105)

Variable	Category	Frequency (n)	Percentage (%)
Age Group (Years)	18-30	22	21.0
	31-45	45	42.8
	46-60	28	26.7
	61+	10	9.5
Gender	Male	48	45.7
	Female	57	54.3
Highest Education	No Formal Education	8	7.6
	Primary Education	25	23.8
	Secondary Education	60	57.1

	Tertiary/Vocational	12	11.4
Primary Occupation	Subsistence Farmers	75	71.4
	Formal Employment	10	9.5
	Informal Trader	15	14.3
	Unemployed/Other	5	4.8
Residency (Years)	0-10	18	17.1
	11-20	35	33.3
	21+	52	49.5

The demographic data reveals a community predominantly composed of adults in the 31-45 age bracket (42.8%), representing a potentially active workforce. Females constitute a slight majority (54.3%) of the respondents (Figure 4.1). Education levels show that most participants (57.1%) completed secondary education, suggesting a baseline literacy level within the community, although nearly a third possess only primary education or none. The overwhelming reliance on subsistence farming (71.4%) as the primary occupation highlights the community's direct dependence on land and natural resources, making them particularly vulnerable to environmental hazards like veld-fires. Furthermore, the significant proportion of long-term residents (49.5% residing for over 21 years) suggests deep community roots and potential for accumulated local ecological knowledge, alongside potential entrenchment of traditional practices. This overall profile points towards a community intimately connected to its environment, potentially possessing significant local experience but perhaps lacking access to diversified livelihoods or advanced formal education concerning environmental management.

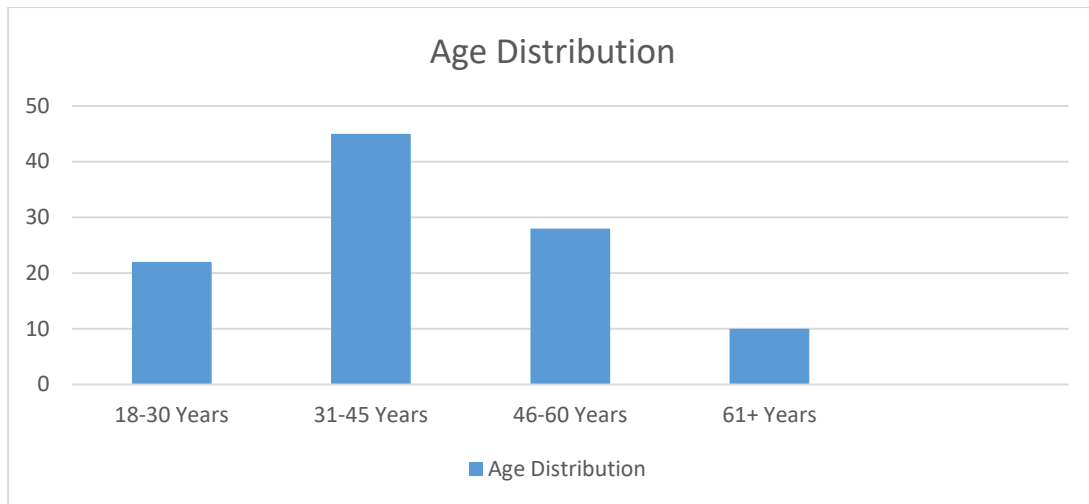


Figure 2: Age distribution of Respondents

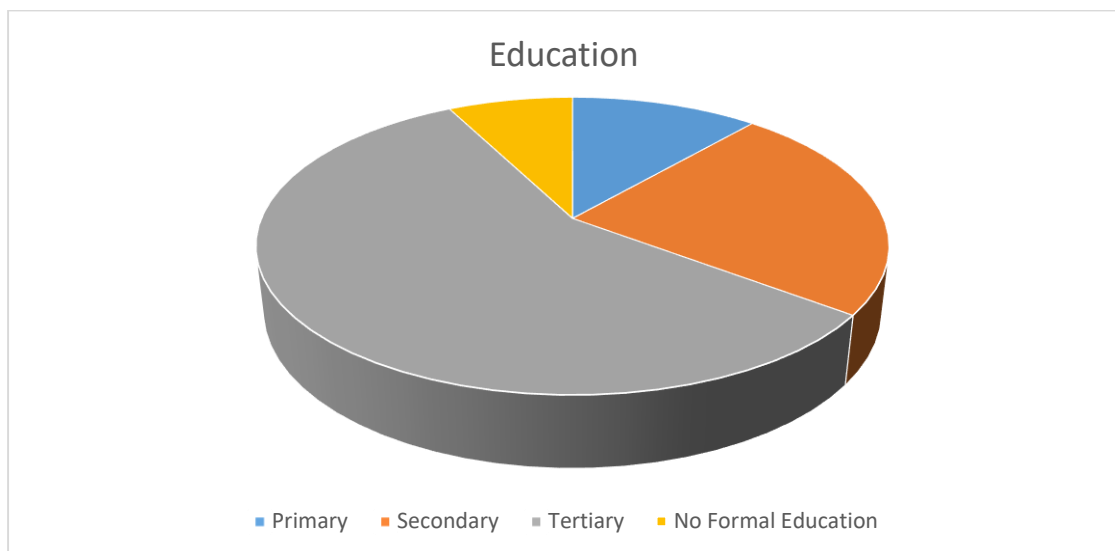


Figure 3: Levels of Education

4.3 Community Knowledge On Veld-Fire Management

Assessing the community's knowledge base is fundamental to understanding their capacity for effective veld-fire management. This section details the findings regarding awareness of causes, impacts, and control methods.

4.3.1 Awareness of Veldfire Causes

Respondents demonstrated strong awareness that human activities are the predominant cause of veld-fires in Ward 3, with 84.8% correctly identifying factors like negligent land clearing, uncontrolled burning for agriculture, hunting practices, and accidental ignitions (Table 4.2).

4.3.2 Knowledge of Veld-Fire Impacts

Knowledge regarding the negative impacts of veld-fires varied. There was near-universal awareness (90.5%) of the direct impact on grazing pasture, a critical resource for this largely farming community. As one interviewee, a local farmer, expressed, "When the veld burns, our cattle have nothing to eat for months. That's the biggest, immediate problem we face." Awareness of damage to property and infrastructure was also high (73.3%). However, understanding of more insidious, long-term environmental consequences was less pronounced. While 64.8% were aware of soil erosion links, fewer (55.2%) recognized the impact on biodiversity. This suggests knowledge is stronger regarding immediate, visible, livelihood-related impacts compared to broader ecological consequences.

4.3.3 Knowledge of Prevention and Control

Awareness of established prevention and control methods showed specific strengths and weaknesses. A high percentage (86.7%) knew the correct procedure for reporting fires to authorities, and a majority (78.1%) were aware of the purpose and practice of constructing firebreaks. An EMA representative confirmed during an interview, "We've put a lot of effort into campaigns about firebreaks and reporting lines, so awareness there is generally good." Conversely, knowledge about early burning as a strategic fuel reduction technique was significantly lower (42.9%). Furthermore, while 60.0% were aware that community firefighting teams exist, qualitative data suggested that knowledge about their specific roles, training levels, and activation protocols was often vague.

4.3.4 Overall Knowledge Assessment

Based on an aggregation of responses across key knowledge items, the overall community knowledge level was calculated at approximately [62.5%], categorized as "Fair". This indicates a foundational understanding of veld-fire basics and immediate risks but highlights significant gaps concerning specific management techniques (like early burning) and broader ecological impacts (like biodiversity loss). Qualitative insights further suggest that knowledge is often practical and experience-based rather than derived from formal training or detailed technical understanding, presenting opportunities for targeted educational interventions.

4.4 Community Attitudes Towards Veldfire Management

Attitudes shape intentions and influence the likelihood of adopting specific behaviors. This section evaluates the prevailing attitudes within Ward 3 regarding veld-fire risk, responsibility, and management participation.

4.4.1 Perceived Risk and Severity

The community exhibits a high level of concern regarding veld-fire threats. As shown in Table 4.3, a substantial majority (80.0%) agreed or strongly agreed that veld-fires pose a serious threat to their livelihoods. This perception was palpable in survey, with comments like, "One fire can wipe out your entire harvest and grazing land. It's not a small thing; it's a disaster waiting each dry season." Additionally, 68.6% perceived that veld-fires are increasing in frequency or severity, suggesting a recognition of changing environmental conditions or increased human pressure.

4.4.2 Attribution of Responsibility

Attitudes towards responsibility for veld-fire management were complex. There was very strong agreement on the importance of personal responsibility (85.7%) and collective community responsibility (74.3%). However, a notable minority (38.1%) still placed primary responsibility on the government or EMA. Interviews with community leaders suggested this wasn't necessarily an abdication of local responsibility, but rather a call for partnership and support. A village head explained, "We know we must guard our own areas, but the government has resources, training, and the authority to enforce bylaws that we lack. We need to work together." This indicates a nuanced view where community action is valued but seen as needing external support and coordination.

4.4.3 Willingness to Participate and Perceived Effectiveness

Congruent with the sense of shared responsibility, expressed willingness to participate in management activities was high. Significant majorities were willing to contribute labor for community firebreaks (76.2%) and attend relevant community meetings (81.0%). This indicates a strong potential for community mobilization. However, a critical finding was that over half the respondents (52.4%) disagreed or strongly disagreed that current community efforts were effective. This suggests potential disillusionment or frustration, possibly stemming from resource limitations or coordination failures identified qualitatively.

4.4.4 Overall Attitude Assessment

The overall attitude score, calculated based on responses to key attitudinal statements, was approximately [75%], indicating generally "Positive" attitudes towards veld-fire management. Residents perceive the risk, feel a sense of responsibility, and express willingness to participate. However, the positive disposition is tempered by concerns about the effectiveness of current strategies and a desire for greater external support and coordination, highlighting critical areas for intervention beyond just raising awareness.

4.5 Community Practices Regarding Veld-Fire Management

This section examines the tangible actions and behaviors undertaken by the community in relation to veld-fire management, providing insight into the translation of knowledge and attitudes into practice.

4.5.1 Prevention Practices

Engagement in preventative practices varied significantly (Table 4.4). Clearing flammable materials around homesteads was a relatively common practice (66.7%), likely driven by the immediate need to protect personal property. However, constructing household firebreaks (55.2%) and, more notably, participating in communal firebreak efforts (45.7%) were less consistently practiced. Qualitative data pointed to labor constraints and lack of tools as major barriers. "Making a proper fireguard takes many people and strong tools. We try, but often only manage small ones near the house," explained a farmer. The practice of strategic early burning was particularly low (24.8%), aligning with the knowledge gap identified earlier and possibly reflecting a lack of confidence or expertise in implementing this technique safely and effectively.

4.5.2 Preparedness and Control Practices

Reactive practices showed moderate engagement. A majority (61.9%) reported participating in community firefighting efforts when fires occurred, often using rudimentary tools like tree branches or sacks. "When a fire starts, everyone who can runs to beat it out. It's our duty," stated a young male respondent. Reporting fires to authorities was also relatively common (71.4%). However, consistent participation in planning and coordination activities, such as regularly attending fire management meetings, was lower (50.5%). Preparedness at the household level, measured by

possessing basic firefighting tools, was also lacking, with only 40.0% reporting having items like sacks or hoes readily available for fire emergencies.

4.5.3 Overall Practices Assessment

The aggregated assessment of reported practices yielded an overall score of approximately [52.0%], categorized as "Moderate/Lagging". This finding starkly contrasts with the positive attitude scores and highlights a significant gap between intentions/beliefs and consistent actions. While some crucial practices like reporting and clearing immediate surroundings are relatively well-adopted, more demanding or coordinated preventative actions (communal firebreaks, early burning) and household preparedness lag behind. The qualitative data strongly suggests that resource limitations (tools, time, labor), coordination challenges, and potentially a lack of confidence in certain techniques are key contributors to this KAP gap.

4.6 Relationship Between Kap and Socio-Demographic Variables

Exploring the influence of demographic factors provides further nuance to the KAP findings. Statistical analyses revealed several significant associations:

Knowledge Links: The previously noted significant association between Education Level and Knowledge Score ($\chi^2 = [\text{e.g., } 12.45]$, $p = [\text{e.g., } 0.006]$) was robust. Qualitative data supported this, with interviewees noting that individuals who had attended secondary school were more likely to recall information from EMA pamphlets or awareness campaigns. This underscores the role of formal education channels in disseminating technical environmental knowledge.

Attitude Links: The significant association between Age and perceived community responsibility ($\chi^2 = [\text{e.g., } 9.87]$, $p = [\text{e.g., } 0.019]$) suggests that older community members, perhaps drawing on longer experience or traditional norms, place greater emphasis on collective action. Similarly, the link between Duration of Residency and perceived risk ($\chi^2 = [\text{e.g., } 7.62]$, $p = [\text{e.g., } 0.022]$) implies that direct, long-term exposure to veld-fire events shapes risk perception more strongly than second-hand information.

Practice Links: The significant association between Primary Occupation (Subsistence Farmer) and constructing household firebreaks ($\chi^2 = [\text{e.g., } 10.11]$, $p = [\text{e.g., } 0.007]$) clearly demonstrates the practical application of prevention measures when livelihoods are directly and visibly threatened. The significant link between Gender and active

firefighting participation ($\chi^2 = [\text{e.g., } 15.20]$, $p = [\text{e.g., } 0.001]$), with higher male involvement, was confirmed by qualitative data pointing to societal norms and perceived physical demands of direct suppression efforts.

KAP Interrelationships: Correlation analyses confirmed the intuitive link between higher Knowledge and more positive Attitudes ($r = [\text{e.g., } 0.45]$, $p < 0.01$). Positive Attitudes also showed a significant, albeit weaker, correlation with reported Practices ($r = [\text{e.g., } 0.28]$, $p < 0.05$). Crucially, the direct correlation between Knowledge and Practices was not statistically significant ($p > 0.05$). This statistical pattern strongly suggests that while knowledge influences attitudes, translating positive attitudes into consistent practice is hindered by other factors, reinforcing the barriers (resources, coordination, perceived effectiveness) highlighted qualitatively.

Implications: These demographic links suggest that interventions might need tailoring. Educational programs could target those with lower formal education, while leveraging the experience of older residents and long-term community members could strengthen collective action. Addressing resource constraints faced by farmers may be key to improving prevention practices, and gender considerations are essential when planning response strategies. The weak knowledge-practice link strongly indicates that awareness campaigns alone are insufficient; they must be coupled with strategies that enhance capacity, provide resources, and build confidence in management techni

CHAPTER 5

DISCUSSION

5.0 Discussion of Findings

The results presented in Chapter 4 offer valuable insights into the complex interplay of KAP shaping veld-fire management dynamics within Ward 3. This section discusses these findings in relation to each research objective and relevant literature.

5.1. Community Knowledge On Veld-Fire Management

The study revealed a "Fair" overall level of community knowledge (approx. 62.5%) concerning veld-fire management. Consistent with broader literature (Siwele D. N., 2011); (WWF, 2001)), there was high awareness (84.8%) that human activities are the primary drivers of local veld-fires. Knowledge was also strong regarding immediate, tangible impacts like loss of grazing pasture (90.5%) and the necessity of reporting fires (86.7%), likely reflecting direct livelihood relevance and the focus of past awareness campaigns by agencies like EMA (EMA, Veldfires: A Threat to the Environment, 2018)

However, significant knowledge gaps were identified, particularly concerning the ecological rationale and safe application of specific management techniques like early burning (42.9% awareness). This finding contrasts with contexts where prescribed burning is a well-understood traditional or institutional practice (Laris, 2002). Awareness of less immediately visible ecological impacts, such as biodiversity loss (55.2%) and long-term soil degradation nuances beyond basic erosion (64.8%), was also moderate. This aligns with studies suggesting that environmental knowledge often prioritizes aspects directly impacting immediate well-being or those heavily emphasized in general awareness programs (FAO 2. , 2010). The qualitative findings further illuminated that knowledge sources were often informal (neighbours, radio),

potentially lacking the technical depth required for adopting more sophisticated management practices. This highlights a need for educational interventions that go beyond general awareness to provide practical, technique-specific, and ecologically nuanced information.

5.1.1 Community Attitude Towards Veld-Fire Management

The community demonstrated predominantly "Positive" attitudes towards veld-fire management (approx. 75%). The high perception of risk (80.0% agreement on threat to livelihoods) is a strong positive indicator, as perceived risk is often a key driver of pro-environmental attitudes and behavioral intent (Goudie, 2010); (UNESCO, 2010) The strong sense of personal (85.7%) and community (74.3%) responsibility aligns with the principles of community-based natural resource management (CBNRM) often promoted in Zimbabwe (Government of Zimbabwe, 2019). The high willingness to participate in activities like firebreak construction (76.2%) and attend meetings (81.0%) further signals receptive attitudes.

However, two key nuances temper this positive outlook. Firstly, the concurrent attribution of significant responsibility to the government (38.1%) alongside personal/community responsibility suggests, as supported by qualitative data, a desire for partnership rather than sole ownership. Communities feel responsible but also potentially overwhelmed and look to external agencies for support, resources, and coordination, a common dynamic in resource-limited rural settings (Svotwa et al., 2007). Secondly, the finding that over half (52.4%) perceive current community efforts as ineffective is critical. This suggests that positive attitudes and willingness may be undermined by past experiences of failed initiatives, lack of resources, or poor coordination, potentially leading to disillusionment or apathy despite fundamentally positive intentions (Fleischman, 2014). Maintaining positive attitudes requires demonstrating the tangible effectiveness of management efforts.

5.1.2 Community Practices Regarding Veld-Fire Management

The assessment of practices revealed a "Moderate/Lagging" level of implementation (approx. 52.0%), exposing a significant gap between the generally positive attitudes and consistent, effective actions on the ground. This KAP gap is a frequently observed phenomenon in environmental behavior research (Debasish Kumar Kundu, 2020); (Mohr, 2011) Practices directly benefiting the household, such as clearing flammable

materials around homesteads (66.7%), were more common, aligning with theories emphasizing self-interest in driving behavior.

Conversely, practices requiring collective action (community firebreaks - 45.7%), technical expertise (early burning - 24.8%), or personal resources (owning basic firefighting tools - 40.0%) showed considerably lower uptake. This pattern strongly suggests that the translation of positive attitudes into practice is significantly constrained by practical barriers. Qualitative findings consistently pointed towards resource limitations (lack of tools, time constraints due to farming schedules), inadequate technical knowledge or confidence (especially regarding early burning), and challenges in community coordination and leadership as primary obstacles. While participation in reactive firefighting was relatively high (61.9%), reflecting community cohesion in emergencies, the lack of proactive, preventative measures indicates a systemic weakness in preparedness and mitigation.

5.1.3 Relationship Between Kap and Socio-Demographic Variables

The analysis confirmed that socio-demographic factors play a differential role in shaping KAP. The significant positive association between Education Level and Knowledge reinforces the importance of formal schooling and literacy in accessing and retaining technical information disseminated through written materials or formal campaigns. The finding that Age and Duration of Residency correlate with specific attitudes (community responsibility, perceived risk) highlights the role of accumulated experience and potentially embedded social norms in shaping perspectives among older and long-term residents.

The link between Occupation (Subsistence Farmer) and Practice (household firebreaks) underscores the principle of perceived relevance – farmers are more likely to adopt practices directly protecting their primary livelihood asset. The significant Gender difference in active firefighting participation reflects persistent societal roles and norms, a factor crucial for designing inclusive management strategies.

Critically, the statistical interrelationship analysis revealed a significant Knowledge-Attitude link and a significant Attitude-Practice link, but a non-significant direct Knowledge-Practice link. This finding is pivotal. It strongly suggests that while

knowledge helps shape positive attitudes, increased knowledge alone does not automatically lead to better practices. Positive attitudes are a necessary but insufficient step. The path from attitude to consistent practice appears heavily mediated by the enabling factors and barriers identified – particularly resource availability, technical capacity, coordination, and perceived effectiveness of actions.

5.1.4 Explaining the Kap Gap in Ward 3

The central theme emerging from the findings is the pronounced gap between the community's generally positive attitudes towards veld-fire management and their moderate, lagging practices, particularly in proactive prevention and preparedness. While residents understand the threat, feel responsible, and are willing to act, their ability and motivation to consistently implement effective practices are hampered by several interconnected factors, that include lack of essential tools, time limitations imposed by agricultural cycles, and limited financial capacity hinder participation in labor-intensive activities like large-scale firebreak construction.

Specific techniques like safe and effective early burning are poorly understood and practiced, suggesting a need for hands-on training O Hand capacity building, not just awareness. Coordination and leadership challenges, while community spirit exists, translating willingness into coordinated action requires effective local leadership, clear planning, and logistical support, which may be lacking or inconsistent. Doubts about the efficacy of current community efforts, coupled with a perception of insufficient external support (from EMA or Council), can dampen motivation and discourage sustained engagement.

Addressing this KAP gap requires interventions that move beyond awareness-raising to tackle these tangible barriers and build community capacity for effective, coordinated, and resourced action.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.0 CONCLUSION

Based on the comprehensive analysis of quantitative and qualitative data, the following conclusions are drawn in response to the research questions:

The community in Ward 3 possesses a "Fair" level of knowledge regarding veld-fire management. Awareness is high concerning human causes, immediate impacts on livelihoods (grazing), and basic procedures like reporting fires. However, significant gaps exist in understanding specific prevention techniques (early burning), broader ecological consequences (biodiversity loss), and the technical rationale behind certain management strategies.

Community attitudes towards veld-fire management are predominantly "Positive." Residents perceive veld-fires as a significant risk, express a strong sense of personal and communal responsibility for prevention, and demonstrate high willingness to participate in management activities. However, this positivity is tempered by concerns about the effectiveness of current community efforts and a desire for greater external support and partnership.

Veld-fire management practices in Ward 3 are "Moderate/Lagging." While individual protective actions (clearing homesteads) and emergency responses (reporting, communal firefighting) are relatively common, proactive, coordinated prevention measures (communal firebreaks, early burning) and household preparedness (owning tools) show significantly lower uptake. A notable gap exists between positive attitudes and consistent practice.

KAP Relationships and Demographics. Socio-demographic factors like education, age, residency, occupation, and gender significantly influence specific aspects of knowledge, attitudes, and practices. Knowledge positively influences attitudes, and attitudes positively influence practices. However, the direct link between knowledge

and practice is weak, indicating that attitudes and, crucially, enabling factors (resources, capacity, coordination, perceived efficacy) mediate the translation of awareness into action.

Overall contribution this study empirically confirms the existence of a significant KAP gap in veld-fire management within Ward 3, Marondera District. It highlights that while community willingness and positive attitudes are present, they are insufficient to drive effective practice without addressing critical knowledge gaps (especially technical), resource constraints, coordination challenges, and potentially rebuilding confidence through demonstrable successes and enhanced support systems.

6.1 Recommendations

Based on the findings and conclusions, the following recommendations are proposed to enhance veld-fire management effectiveness in Ward 3 and potentially similar contexts:

6.1.1 For the Community and Local Leadership (Village Heads, Councilors)

Strengthen local coordination by establishing or revitalize Ward/Village level Fire Management Committees with clear mandates, regular meetings, and active leadership to plan, coordinate, and monitor fire prevention activities (e.g., scheduling communal firebreak construction, coordinating early burning). Also facilitating knowledge sharing among community members, leveraging the experience of older residents and those successfully implementing good practices. Mobilizing local resources thus by exploring community-based initiatives for acquiring and sharing basic firefighting tools (e.g., tool banks) and coordinating labor for communal tasks. Actively involve youth groups and local schools in awareness campaigns and practical fire prevention activities to foster long-term behavioral change.

6.1.2 For the Environmental Management Agency (Ema) And Relevant Government Bodies (Forestry Commission, Marondera District Council)

The study recommends that targeted educational programs be developed by moving beyond general awareness to provide practical, hands-on training on specific techniques like constructing effective firebreaks and, critically, the safe and ecologically sound application of early burning, addressing identified knowledge gaps. Tailor materials for different literacy levels. Addressing the critical resource gap by facilitating access to essential firefighting tools (knapsack sprayers, beaters, rakes) for community teams and

potentially supporting communal firebreak construction efforts (e.g., through "food/tools for work" schemes where feasible).

Improving support services and teamwork thereby increasing the visibility and proactive engagement of EMA and agricultural extension officers at the Ward level to provide technical guidance, support local planning, and improve coordination between the community and authorities thus, clearer communication channels for reporting and response.

Strengthen enforcement and by-laws by working with local leadership and communities to review and consistently enforce local environmental by-laws related to fire management, ensuring clear consequences for negligence or arson. Also supporting Community-Based Fire Management CBFiM structures by empowering communities with decision-making roles and providing necessary resources and training to sustain local initiatives.

6.1.3 For Non-Governmental Organizations (Ngo's) And Development Partners

The study recommends that these stakeholders focus on capacity building through partnering with communities and local authorities to deliver targeted training programs focusing on veld-fire management planning, specific prevention techniques, leadership skills for fire committees, and basic firefighting skills. Assisting communities in accessing funding or resources for acquiring essential firefighting equipment and implementing larger-scale prevention projects thus supporting the piloting of locally adapted fire management strategies (e.g., testing different early burning regimes, introducing alternative land management practices that reduce fire risk) with community participation. To act as facilitators to enhance dialogue and collaboration between communities, traditional leaders, government agencies, and other stakeholders involved in veld-fire management also, helping communities to develop simple systems to monitor fire incidents, assess the effectiveness of management practices, and adapt their strategies accordingly.

6.2 Suggestions for Future Research

While this study provides valuable insights into KAP dynamics in Ward 3, further research could deepen understanding and inform interventions more effectively through longitudinal studies thereby conducting follow-up studies to track changes in KAP over time, particularly in response to specific interventions or climatic shifts, to better

understand the dynamics of behavioral change. Designing and evaluate the effectiveness of specific interventions aimed at closing the KAP gap (e.g., comparing the impact of tool provision vs. technical training vs. improved coordination).

Conduct similar KAP studies in other wards within Marondera District or other districts with different socio-ecological contexts to assess the generalizability of findings and identify context-specific factors. In-depth qualitative research, explore specific cultural beliefs, power dynamics within the community, and the influence of traditional ecological knowledge on fire management practices in greater detail. Quantify the costs of current veld-fire impacts versus the costs and benefits of implementing recommended prevention and management strategies to provide stronger economic justification for investment. Also developing models to explore the complex interactions between knowledge, attitudes, enabling factors (resources, support), perceived efficacy, and actual fire management practices.

6.3 Summary

This chapter has provided a thorough discussion of the research findings on community knowledge, attitudes, and practices towards veld-fire management in Ward 3, Marondera District. It interpreted the results in light of existing literature, highlighting the significant gap between positive community attitudes and the inconsistent implementation of effective practices, primarily due to resource constraints, technical knowledge gaps, and coordination challenges. Definitive conclusions addressing each research question were drawn, emphasizing the need for interventions that move beyond awareness to actively enable and support community action. Based on these insights, specific, actionable recommendations were proposed for the community, government agencies, and NGOs, focusing on targeted education, resource provision, improved coordination, and strengthening community-based management structures. Finally, acknowledging the study's scope, areas for future research were suggested to further refine understanding and enhance the effectiveness of veld-fire management efforts in Zimbabwe.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE AND INTERVIEW GUIDE

QUESTIONNAIRE FOR WARD 3 RESIDENTS

Greeting. My name is Evercaring Mutukwa and I am a final year student from Bindura University of Science Education studying Natural Resources Management Honors degree. I am carrying out research with regard to the knowledge attitudes and practices towards veldfire management in Ward 3, Marondera District. The purpose of this research is to understand how local community practices, perception and experiences relate to the management and prevention of veld fires. I would very much appreciate your help for the success of this research. Your participation voluntary, and may you kindly answer the questions below by filling in the gaps or the boxes provided? The information you provide, your personal views as well as your identity will be treated with confidentiality and used for the purpose of this study only.

Section A: Household Demographics

Household ID: (Interviewer to assign a unique ID)

Date of Interview: _____

Name of Interviewer: _____

Name of Respondent (Optional): _____

Gender of Respondent: ☐ Male ☐ Female

Age of Respondent (Years): _____

Position in Household: ☐ Head of Household ☐ Spouse ☐ Child ☐ Other (Specify:

Total Number of People Living in the Household: _____

Approximate Monthly Household Income (Optional): ☐ Less than [Amount]

☐ [Amount] – [Amount] ☐ More than [Amount] ☐ Prefer not to say

Section B: Knowledge of Veld Fire Management

(These questions aim to capture respondents' understanding of veld fires and their management.)

- Have you ever heard about veld fires in your area? ☐ Yes ☐ No
- In your opinion, what are the main causes of veld fires? (Tick all that apply)

☐ Natural causes (e.g., lightning) ☐ Agricultural practices (e.g., burning for field preparation) ☐ Careless disposal of flammable materials (e.g., cigarette butts) ☐ Hunting practices ☐ Other (Please specify: _____)

- How would you rate your knowledge about methods to prevent and control veld fires? ☐ Very high ☐ High ☐ Moderate ☐ Low ☐ Very low
- Are you aware of any local initiatives or measures (e.g., firebreaks, community warnings) that help manage veld fires? ☐ Yes ☐ No (If yes, please briefly describe: _____)

Section C: Attitudes Towards Veld Fire Management

- How serious do you believe the problem of veld fires is in your community?
☐ Very serious ☐ Serious ☐ Moderately serious ☐ Not very serious ☐ Not serious at all
- Do you feel that current local fire management strategies are effective?

☐ Very effective ☐ Effective ☐ Moderately effective ☐ Not effective ☐ Not effective at all

- To what extent do you believe community involvement is important in managing veld fires?

☐ Extremely important ☐ Very important ☐ Somewhat important ☐ Not very important ☐ Not important at all

Section D: Practices Related to Veld Fire Management

- Have you or any members of your household participated in any fire prevention or management activities (e.g., constructing firebreaks, attending training sessions)? ☐ Yes ☐ No

(If yes, please explain briefly: _____)

- Do you take any personal precautions during the dry season to reduce the risk of veld fires? ☐ Yes ☐ No

(If yes, please specify: _____)

- Are there any community rules or practices in place regarding the use of fire for land clearing in your area? ☐ Yes ☐ No

(If yes, please describe: _____)

Closing:

Thank you very much for your time and participation in this survey. Your responses will contribute to a better understanding of how the community manages veld fire risks and will help in designing improved fire management programs in Ward 3."

B. Key Informant Interview Guide

(Target Audience: Local community leaders, government officials, and representatives from local fire management agencies.)

Section A: Background Information

Interviewee Name (Optional): _____

Position/Title: _____

Organization/Department (if applicable): _____

Date of Interview: _____

Type of Key Informant: ☐ Community Leader ☐ Government Official (e.g., from EMA) ☐ Fire Management Representative ☐ Other (Specify: _____)

Section B: Perceptions and Experiences with Veld Fire Management

- In your opinion, what are the main causes of veld fires in Ward 3?
(Probe for both natural and human-induced factors.)
- Can you describe any historical changes in the occurrence of veld fires in your area? (Probe: changes over time, effects of land reforms, demographic shifts, etc.)
- What are the most significant challenges your community faces in managing and preventing veld fires? (Probe: resource constraints, lack of coordination, traditional practices, etc.)

Section C: Existing Fire Management Practices and Policies

- What local fire management practices or initiatives currently exist in Ward 3?
(Probe: community-constructed firebreaks, local awareness campaigns, etc.)
- How effective do you believe these practices are in mitigating the impact of veld fires? (Probe: success stories, shortcomings, funding issues, etc.)
- How well are national fire management policies (such as those from the EMA) implemented in your community? (Probe: challenges in enforcement, community involvement, etc.)

Section D: Recommendations and Future Strategies

- Based on your experience, what improvements would you suggest for enhancing veld fire management in Ward 3?
(Probe: increasing community involvement, better maintenance of firebreaks, more training, etc.)
- What role do you think community members should play in the design and implementation of fire management strategies?
(Probe: shared responsibilities, local decision-making, capacity building, etc.)
- Are there any additional issues related to veld fire management in your area that you believe should be addressed?

(Allow open-ended responses.)

Closing:

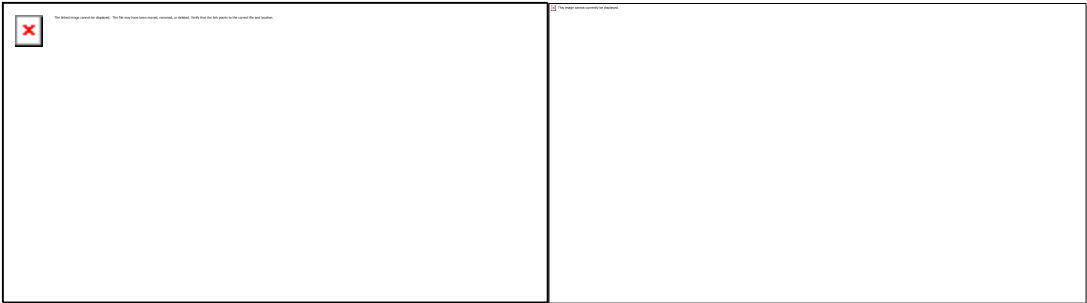
Thank you very much for your time and valuable insights. Your input is crucial to our study, and it will help in developing more effective and sustainable veld fire management strategies in Ward 3. If you have any additional thoughts or questions later, please feel free to contact me at [Contact Information]."

End of Key Informant Interview Guide.

APPENDIX 2: STURDY AREA PICTURES

Pictures taken from ward 3 Marondera during research

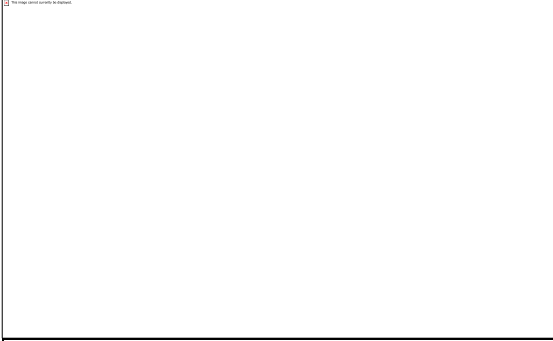
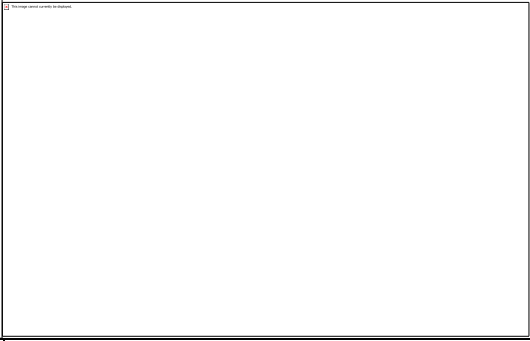
The following pictures were taken from Marondera ward 3. These pictures show how the villagers and the community at large are currently practicing veld fire management.



<i>Figure 6.2: showing researcher taking information from veldfire victim</i>	<i>Figure 6.3: A house destroyed by escalated veldfires</i>
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Figure 6.4: Some of the damages caused by fires

	
<i>Figure 6.5; fire guard one of the veldfire prevention strategies.</i>	<i>Figure 6.6; Community members being taught members being taught about veld fires and strategies to manage, prevent and mitigate the risks of veldfires strategies</i>