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**LANDSCAPE FIRE
MANAGEMENT**

IN THE WESTERN BALKANS

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STRATEGY

FOR

ADAPTIVE LANDSCAPE MANAGEMENT

AND

LANDSCAPE FIRE MANAGEMENT

IN THE FEDERATION OF BOSNIA AND HERZEGOVINA, BOSNIA AND HERZEGOVINA



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Strategy for Adaptive Landscape and Landscape Fire Management on the level of Federation of Bosnia and Herzegovina, Bosnia and Herzegovina, The Landscape Fire Management Report on the level Federation of Bosnia and Herzegovina, Bosnia and Herzegovina is prepared within the Landscape Fire Management in the Western Balkans (LFMWB) Programme financed by the Swiss Agency for Development and Cooperation (SDC) and coordinated by Farmahem – Skopje with backstopping support of Helvetas Swiss Intercooperation. The process for preparation of this Strategy was coordinated by the Ministry of Agriculture, Water Management and Forestry of the Federation of Bosnia and Herzegovina with the support of the Regional Fire Monitoring Centre (RFMC) for the Southeast Europe/Caucasus Region as partners of the LFMWB Programme.

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LIST OF ABBREVIATIONS

Acronym	Full Form
CCPA	Cantonal Civil Protection Agency
BiH	Bosnia and Herzegovina
EU	European Union
FBiH	Federation of Bosnia and Herzegovina
FCPA	Federal Civil Protection Agency
FHI	Federal Hydrometeorological Institute
FMAWF	Federal Ministry of Agriculture, Water Management and Forestry
FMP	Forest Management Plans
LFM	Landscape Fire Management
LFMWB	Landscape Fire Management in the Western Balkans
LF	Landscape fires
NGO	Non-governmental organization
PESTLE	Political, Economic, Social, Technological, Legal and Environmental factors

1. INTRODUCTION

FBiH, Bosnia and Herzegovina is characterized by a diverse array of natural landscapes, ranging from forests to different types of agricultural fields, which are integral to the regions ecological balance and economy. However, this richness is increasingly threatened by landscape fires, which have intensified in frequency and severity due to a combination of climate change, land use practices, and socio-economic dynamics. The destructive impacts of landscape fires extend beyond environmental degradation; they pose significant risks to human health, safety, and the economy, particularly in rural communities that rely heavily on the land for their livelihoods. In response to these challenges, the development of Strategy for adaptive landscape management and landscape fire management in the FBiH, Bosnia and Herzegovina is essential to establish a framework that effectively addresses both prevention and preparedness.

The overarching goal of the Strategy is to enhance the resilience of ecosystems and communities against the threat of landscape fires while promoting sustainable land management practices. The strategy aims to integrate fire management practices into broader environmental policies and land use planning initiatives, ensuring that fire is recognized not merely as a hazard but also as a natural process that can be managed. By doing so, the Strategy will contribute to the sustainability of natural resources, preserve biodiversity, and maintain the vitality of local economies dependent on agriculture and forestry.

Key components of the Strategy include PESTLE analysis, strategy goals and actions plan. A thorough assessment of landscape fire risk will identify critical areas vulnerable to ignition and spread, allowing for targeted interventions that minimize potential damage. Furthermore, education and awareness campaigns will play an important role in fostering a culture of prevention, empowering local communities to adopt best practices in land management and fire safety. By involving stakeholders at all levels, from government agencies to local residents, the Strategy seeks to create a collaborative approach that supports shared responsibility for fire management.

The role of technology cannot be overlooked in the modern context of fire management. Remote sensing, geographic information systems (GIS), and satellite imagery provide vital tools for monitoring forest conditions, predicting fire behaviour, and evaluating the effectiveness of management interventions. Integration of such technologies into the Strategy will enhance situational awareness and facilitate timely decision-making during fire events. Additionally, the adoption of early warning systems can provide critical information that enables communities to prepare for potential fire outbreaks, further reducing risks to life and property.

Moreover, the successful implementation of the Strategy will require the participation of a broad range of stakeholders, including government institutions, non-governmental organizations and local communities. Collaborative frameworks for information sharing and resource mobilization will be essential in fostering a unified approach to landscape fire management. In particular, the Federal Ministry of Agriculture, Water Management, and Forestry of FBiH will serve as a key partner institution in this endeavour, providing vital guidance and support throughout the implementation process. Their expertise will ensure that the Strategy aligns with national policies and integrates fire management into sustainable land-use planning.

Finally, the document is a strategic framework with clearly defined goals that takes into account changing environmental conditions, community needs, and advances in landscape fire management practices. Regular monitoring and evaluation will be fundamental to the successful implementation of the Strategy. By establishing a culture of learning and flexibility, the FBiH can position itself to not only mitigate the immediate threats posed by landscape fires but also to enhance the resilience of its ecosystems and communities for generations to come.

In conclusion, the Strategy for adaptive landscape management and landscape fire management in the FBiH, Bosnia and Herzegovina, represents a crucial step toward addressing the growing challenges posed by landscape fires. Through a comprehensive, collaborative, and adaptive approach, the strategy aims to safeguard the natural and cultural landscapes of FBiH while empowering local communities to thrive in harmony with their environment. The successful implementation of this Strategy will be essential for ensuring a sustainable future for the Federation of Bosnia and Herzegovina in the face of evolving climate dynamics and land management challenges.

2. OVERVIEW OF THE LFM SITUATION

FBiH, Bosnia and Herzegovina boasts a range of landscapes, from mountains and forests to agricultural fields, all of which are vulnerable to landscape fires. The areas diverse climate, marked by hot, dry summers and wet winters, increases the danger of fires, especially in the summer when the vegetation becomes dry and highly flammable. An effective landscape fire management strategy is thus crucial to mitigate the impact of landscape fires on ecosystems, communities, and local economies. The current landscape fire management situation in FBiH reveals both significant challenges and ongoing efforts aimed at strengthening fire prevention, response, and recovery mechanisms, mainly through the Landscape Fire Management in the Western Balkans Programme.

In recent years, FBiH, Bosnia and Herzegovina has faced several severe landscape fire incidents, which have highlighted the vulnerabilities within the existing fire management framework. The incidence of landscape fires has surged in part due to climate change, which has intensified weather patterns and extended the fire season. Throughout the region, there have been calls for more comprehensive and integrated approaches to landscape fire management that encompass prevention, preparedness, response, and recovery. Despite the challenges, national and local agencies have made strides in addressing these issues, with a focus on enhancing collaboration among various stakeholders, including governmental bodies, non-governmental organizations, and community groups.

One of the key aspects of the landscape fire management situation in FBiH is the integration of technology in monitoring and combating LFs. The use of satellite imagery and Geographic Information Systems (GIS) has improved the ability to assess fire risks and monitor land use changes that can contribute to fire outbreaks. Early warning systems have also been planned to be implemented to provide timely information to local authorities and the public, enabling proactive measures. Such advancements are crucial in a landscape which often characterized by limited resources and infrastructure.

Also, public awareness and education about fire risks remain critical components of landscape fire management. Campaigns aimed at informing communities about responsible land use, safe practices during fire-prone seasons, and proper reporting procedures are essential. Educational programmes targeting specific groups such as farmers, hikers, and recreational users of forested areas can help foster a culture of prevention. Furthermore, training programmes for local fire brigades and volunteers enhance the capacity of communities to respond effectively when landscape fire occurs. The involvement of local populations in fire management efforts not only augments resources but also builds resilience, as communities become empowered to take an active role in safeguarding their environment.

On the institutional level, the landscape fire management system in FBiH, Bosnia and Herzegovina continues to evolve. Various governmental agencies oversee fire prevention and response, yet challenges such as coordination and funding persist. The establishment of a unified command structure and standardized protocols among different agencies can improve response times and enhance resource utilization. Cross-border cooperation with neighbouring regions experienced in fire management can also provide valuable insights and support, as landscape fires do not recognize political boundaries.

The overview of the current LFM situation in FBiH, Bosnia and Herzegovina, reveals a system characterized by fragmented governance, uneven institutional capacities, and limited coordination between cantonal and federal levels. Responsibilities related to landscape fire prevention, land management, forestry, and emergency response are distributed across multiple sectors and levels of authority, often without

sufficient harmonization or clearly defined coordination mechanisms. Legislative and regulatory frameworks remain partially aligned and, in some areas, outdated, resulting in inconsistencies in implementation and enforcement across cantons. Deficiencies in data availability, standardized monitoring, and integrated planning further constrain evidence-based decision-making. These structural and operational shortcomings underscore the strategic necessity for comprehensive LFM reform, aimed at strengthening institutional coordination, harmonizing legislation, improving data systems, and shifting from a predominantly reactive fire response toward an integrated, preventive, and landscape-based approach to fire management in FBiH, Bosnia and Herzegovina.

2.1 Legal framework for LFM

This legal framework encompasses various governmental bodies, non-governmental organizations, and community stakeholders, each contributing to prevention, preparedness, response, and recovery efforts. By establishing clear roles and responsibilities, along with proactive strategies, the institutional framework aims to enhance resilience against LFs in FBiH, Bosnia and Herzegovina. The Strategy is based on following laws:

Law on Protection and Rescue of People and Material Goods from Natural or Other Disasters (“Official Gazette of the Federation of Bosnia and Herzegovina”, 39/03, 22/06 and 43/10) provides a legal framework for effective response to emergencies and disasters. This law outlines the responsibilities of government bodies, emergency services, and other relevant stakeholders in preparing for, responding to, and recovering from disasters. It aims to ensure the safety and well-being of people and the protection of property during emergency situations such as natural disasters, accidents, or other crises. The law sets out mechanisms for coordination, communication, resource mobilization, and cooperation among different entities to enhance the overall response and resilience to disasters in FBiH, Bosnia and Herzegovina.

Law on Fire Protection and Firefighting (“Official Gazette of the Federation of Bosnia and Herzegovina”, no. 64/09) regulates the organization and functioning of fire protection and firefighting, planning and implementation of fire protection measures, organization and functioning of firefighting and fire extinguishing (firefighting interventions), professional training and development of employees and firefighters, financing, and other important issues for the organization and functioning of fire protection and firefighting in the FBiH, Bosnia and Herzegovina.

Law on Nature Protection (“Official Gazette of the Federation of Bosnia and Herzegovina” 66/13) regulates the conditions and methods for the restoration, protection, conservation, and sustainable development of landscapes, natural areas, plants, animals and their habitats, minerals and fossils, and other natural components within the territory of FBiH, Bosnia and Herzegovina.

Law on Environmental Protection (“Official Gazette of the Federation of Bosnia and Herzegovina” 15/21)

Law on Agricultural Land (“Official Gazette of the Federation of Bosnia and Herzegovina” 52/09) regulates various aspects related to agricultural land, including definitions, management principles, protection measures, land use, organization, records, supervision, criminal provisions, transitional arrangements as well as other important issues related to agricultural land in the territory of the FBiH, Bosnia and Herzegovina.

Law on Seed and Plant Material of Forest and Horticultural Tree and Shrub Species (“Official Gazette of the Federation of BiH”, no. 71/05) regulates the following: registration and the manner of maintaining registers, production and control of forest and horticultural seed and planting material, control of the import of reproductive material, compensation for costs, administrative supervision over the

implementation of this law, penal provisions, and other issues of significance for the implementation of a unified system for the management of seed production and nursery cultivation of forest and horticultural tree and shrub species in the FBiH, Bosnia and Herzegovina.

Other than Federal, there are also Cantonal laws:

Law on Forests of the Una-Sana Canton ("Official Gazette of the Una-Sana Canton", no. 22/12, 16/16, 12/17 and 25/17)

Law on Forests of the Tuzla Canton ("Official Gazette of the Tuzla Canton", no. 7/17)

Law on Forests of the Posavina Canton ("Official Gazette of the Posavina Canton", no. 9/13)

Law on Forests of the Bosnia Podrinje Canton ("Official Gazette of the Bosnia Podrinje Canton, no. 04/13, 5/13, 13/19, 14/19)

Law on Forests of the Sarajevo Canton ("Official Gazette of the Sarajevo Canton" no. 05/13)

Law on Forests of the West Herzegovina Canton ("Official Gazette of the West Herzegovina Canton no. 8/13 and 11/17)

Law on Forests of the Central Bosnia Canton ("Official Gazette of the Central Bosnia Canton" no. 5/14, 12/15, 8/16, 7/18 and 14/20)

Law on Forest of the Zenica Doboј Canton ("Official Gazette of the Zenica Doboј Canton" no. 8/13, 01/15)

Law on Forests of the Canton 10 ("Official Gazette of the Canton 10" no. 04/14)

Cantonal Laws on Forests govern forestry planning, forest management, trade of timber and non-wood forest products, protection of forests and forests land and protection of endangered species as well as improvements in sustainable forest management, including professional and financial assistance to forest owners and users.

In addition to the federal Law on Fire Protection and Firefighting, there are also cantonal laws in certain cantons regulating the field of fire protection and firefighting:

Law on Fire Protection and Firefighting of the Una-Sana Canton ("Official Gazette of the Una-Sana Canton" no.04/13)

Law on Fire Protection and Firefighting of the Posavina Canton ("Official Gazette of the Posavina Canton", no. 12/19)

Law on Fire Protection and Firefighting of the Zenica-Doboј Canton ("Official Gazette of the Zenica-Doboј Canton" no. 05/11 and 24/19)

Law on Fire Protection and Firefighting in the Central Bosnia Canton ("Official Gazette of the Central Bosnia Canton" no. 15/12)

Law on Fire Protection and Firefighting in the Tuzla Canton ("Official Gazette of the Tuzla Canton" no. 01/12 and 03/16)

Law on the Competencies of the Authorities of the Sarajevo Canton in the Field of Fire Protection and Firefighting ("Official Gazette of the Sarajevo Canton" no. 23/11)

Law on Fire Protection and Firefighting in the Herzegovina-Neretva Canton ("Official Gazette of HNK", no. 3/23)

Law on Fire Protection and Firefighting in the Bosansko-Podrinje Canton Goražde ("Official Gazette of the Bosansko-Podrinje Canton Goražde", no. 12/21)

Law on Fire Protection (“Official Gazette of the HBŽ”, no. 7/02 and 5/10), which is not harmonized with the Federal Law on Fire Protection and Firefighting, while the area of firefighting has not yet been legally regulated in the canton.

In FBiH, Bosnia and Herzegovina, cantons govern fire protection and firefighting through their own laws and subordinate legislation, adopted in accordance with the Federal Law on Fire Protection and Firefighting. These cantonal legal frameworks define organizational structures, competencies, financing mechanisms, and operational procedures for fire protection and response within their territories. While they provide an essential legal basis for firefighting capacities and emergency response, their connection to broader LFM approach remains limited and uneven across cantons. Cantonal legislation primarily emphasizes reactive measures – such as fire suppression, organization of fire services, and emergency interventions. Furthermore, differences in legal provisions, implementation practices, and institutional capacities among cantons contribute to fragmented LFM implementation and inconsistent fire risk management across FBiH, Bosnia and Herzegovina. The limited integration of landscape, forestry, agricultural, and environmental considerations into cantonal fire protection laws reduces the effectiveness of long-term fire prevention and resilience. Strengthening the alignment of cantonal fire protection and firefighting legislation with LFM principles – through harmonized legal provisions, clearer preventive mandates, and improved coordination mechanisms – is therefore essential for achieving a more integrated, risk-based, and sustainable approach to managing landscape fires in FBiH.

2.2 LFM stakeholders in FBiH, Bosnia and Herzegovina

In FBiH, Bosnia and Herzegovina, stakeholders engaged in landscape fire management are essential for the protection of natural resources and local communities. Acknowledged through the Landscape Fire Management in the Western Balkans (LFMWB) Programme, these stakeholders consist of government agencies, local communities, NGOs, and environmental organizations. Their coordinated efforts aim to improve fire prevention, preparedness, response, and post-fire management strategies, fostering approach to managing LF risks and promoting sustainable land use practices throughout FBiH, Bosnia and Herzegovina.

Ministry of Security of Bosnia and Herzegovina is a state-level ministry. Within this ministry, there is a sector for protection and rescue. The ministry is responsible for: implementing international obligations and cooperation in the implementation of civil protection, coordinating the actions of entity civil protection services in Bosnia and Herzegovina and harmonizing their plans in case of natural or other disasters affecting the territory of Bosnia and Herzegovina, and developing protection and rescue programmes and plans.

Federal Ministry of Environment and Tourism is a ministry on entity level responsible for nature protection, sustainable development and tourism. Its main objectives include implementing policies and strategies for environmental protection, monitoring and managing natural resources, promoting sustainable tourism practices, and raising awareness about environmental issues.

Cantonal Ministries of Agriculture, Water Management and Forestry are ministries within the cantons responsible for the sectors of agriculture, forestry, and veterinary.

Cantonal Ministries of Environmental Protection are ministries within the cantons responsible for nature protection and sustainable development.

Federal Forestry Agency is part of the Federal Ministry of Agriculture, Water Management, and Forestry and its responsible for overseeing the forestry sector in the FBiH, Bosnia and Herzegovina. Its main tasks

include forest management, protection, promoting sustainable forest management, and implementing forestry policies on the FBiH, Bosnia and Herzegovina, level.

Federal Agency for Civil Protection performs the duties established in the provision of Article 22 of the Law on Federal Ministries and Other Bodies of the Federal Administration ("Official Gazette of the Federation of BiH", no. 58/02, 19/03, 38/05, 2/06, 8/06, 61/06, 52/09, and 48/11). In the area of protection and rescue, the Administration carries out tasks outlined in the provision of Article 26 of the Law on the Protection and Rescue of People and Material Goods from Natural and Other Disasters ("Official Gazette of the Federation of BiH", no. 39/03, 22/06, and 43/10). In the field of fire protection and firefighting, the Administration performs duties established in the provision of Article 13 of the Law on Fire Protection and Firefighting ("Official Gazette of the Federation of BiH", no. 64/09). In the area of demining and disposal of explosive materials, the Administration performs tasks outlined in the Law on Demining in Bosnia and Herzegovina ("Official Gazette of BiH", no. 5/02), as well as in the Law on Protection and Rescue.

Cantonal Forestry Agencies in the FBiH, Bosnia and Herzegovina, are responsible for managing and overseeing forestry activities within cantons.

Federal hydrometeorological institute is a government body monitoring and providing weather forecasts, hydrological data, air quality, seismology and astronomy. Its main tasks include collecting and analysing meteorological data, issuing warnings for weather-related risks, and conducting research on meteorological and climatological trends. The Institute plays a crucial role in providing information to the public, stakeholders, and decision-makers to help in disaster preparedness.

Federal Statistics Agency is a federal authority for statistical affairs in FBiH, Bosnia and Herzegovina. Federal Statistics Agency organizes and conducts statistical research of interest to FBiH, Bosnia and Herzegovina, in accordance with the Law on Statistics in FBiH, Bosnia and Herzegovina.

Federal Administration for Geodetic and Property Affairs in FBiH, Bosnia and Herzegovina, is responsible for overseeing geodetic and cadastral activities at the federal level. It plays a crucial role in maintaining land records, property rights, and spatial data to ensure efficient land management and property registration processes.

Cantonal forestry companies are companies that manage state-owned forests in the territory of FBiH, Bosnia and Herzegovina. The right to manage is granted based on a transfer of rights agreement signed with the cantonal governments. Their main task is to manage forests in accordance with the forest management plans (FMP), which include plans for fire protection.

In conclusion, while the landscape fire management situation in the Federation of Bosnia and Herzegovina presents significant challenges, ongoing efforts to enhance awareness, improve technological capabilities, and foster collaboration among various stakeholders are laying the groundwork for a more effective response to wildfires. Addressing the multifaceted nature of fire management through an integrated and community-oriented approach will be essential for mitigating risks and ensuring the protection of vital ecosystems and human settlements. As FBiH continues to confront evolving challenges posed by wildfires, the commitment to strengthening fire management frameworks will ultimately determine the resilience and safety of both natural and human communities in the region.

The analysis of landscape fire management stakeholders in the Federation of Bosnia and Herzegovina highlights that effective LFM depends on the clearly defined, complementary, and coordinated responsibilities of a wide range of actors operating at federal, cantonal, and local levels. Federal institutions provide the strategic, legislative, and coordination framework; cantonal authorities are responsible for planning, implementation, enforcement, and operational preparedness within their territories; and local governments, fire and rescue services, forestry and land management bodies, and civil protection structures play a direct role in prevention, early detection, response, and post-fire recovery. The effectiveness of these

roles is currently constrained by fragmented mandates, uneven capacities, and limited cross-sectoral coordination. Strengthening cooperation mechanisms, clarifying institutional responsibilities, and aligning stakeholder actions around shared LFM objectives are therefore essential to move from a predominantly reactive firefighting approach toward an integrated, preventive, and landscape-based fire management system in FBiH, Bosnia and Herzegovina.

2.3 Public awareness and education

Public awareness and education are important components of effective landscape fire management in FBiH, Bosnia and Herzegovina. As LFs pose a threat to both nature and people, engaging the public through education initiatives is essential for fostering a culture of prevention and preparedness. By increasing awareness of the causes and consequences of LFs, stakeholders can empower communities to adopt practices that mitigate fire risks and promote overall safety.

One of the primary objectives of public awareness campaigns is to inform the citizens about the environmental conditions that contribute to LF incidents. This includes educating the community on the region's climatic conditions, particularly the hot, dry summers that create an elevated risk for fire outbreaks. Understanding these factors equips individuals with the knowledge to recognize the signs of potential fire hazards in their surroundings, such as dry vegetation and extreme weather warnings. Awareness-raising efforts under this strategy are therefore directed toward clearly defined target groups, including students and youth, farmers and agricultural land users, mountaineers, hikers, and recreational users of natural areas, as well as rural communities and landowners in fire-prone landscapes. Each of these groups interact with the landscape in distinct ways and faces different fire-related risks and responsibilities. The strategic intent of public awareness and education measures is to promote behavioural change, increase understanding of fire risk and prevention obligations, and encourage responsible land and fire use practices, particularly with regard to unsafe or illegal burning. Through improved knowledge, awareness, and engagement, these measures aim to reduce human-caused fires, strengthen community responsibility for landscape maintenance, and support a transition from reactive response to proactive fire prevention. The concrete activities, tools, and communication channels for achieving these outcomes will be further defined through dedicated action plans, ensuring flexibility and adaptation to local conditions across FBiH, Bosnia and Herzegovina.

Also, education initiatives emphasize the importance of maintaining defensible space around properties, which can reduce the risk of LFs spreading to inhabited areas.

Engaging local communities through workshops, seminars, and public events is an effective strategy for fostering a proactive approach to fire management. During these events, participants can learn about landscape fire prevention techniques, the importance of creating firebreaks, and the procedures for reporting a fire quickly and safely. By encouraging community participation, these educational programmes build a network of informed individuals who can support one another in the event of a fire threat. Schools also play important role in this initiative, as incorporating landscape fire management topics into curricula can instil a sense of responsibility in younger generations, ensuring that fire safety awareness is passed down. Introducing age-appropriate topics related to landscape fire risks, prevention, and safe behaviour in landscapes helps children and young people understand the consequences of unsafe fire use and human-caused fires from an early age. Early education supports the development of positive attitudes toward land stewardship, environmental protection, and community responsibility, while also enabling students to act as messengers of fire safety within their families and local communities. Integrating LFM concept into formal education contributes to a lasting culture of prevention and resilience, which is essential for reducing landscape fire risks in the FBiH, Bosnia and Herzegovina over the long term.

Another essential aspect of public awareness is the dissemination of information on local fire management policies and resources. Making citizens aware of the measures implemented by government agencies and organizations, such as the Landscape Fire Management in the Western Balkans (LFMWB) Programme, can help foster trust and collaboration between the community and authorities. Clear communication about available resources, such as firefighting services and community support networks, can empower individuals to act decisively during emergencies.

2.4 LFM-related scientific research

The integration of scientific research into landscape fire management policies in FBiH, Bosnia and Herzegovina, is vital for effective fire prevention and response strategies. Policymakers are encouraged to utilize research findings to inform land-use planning, forest management practices, and community education programmes. Increased collaboration among stakeholders, including local communities, government agencies, and researchers, is essential to foster a holistic approach to landscape fire management. Continued investment in research is necessary to adapt to the evolving challenges posed by climate change. Long-term studies are needed to track changes in fire behaviour, vegetation resilience, and ecosystem health, which can guide adaptive fire management strategies.

Looking forward, research efforts should prioritize the development of predictive models that better anticipate fire risks under varying climatic scenarios. Investigating the effectiveness of prescribed burns as a management tool in FBiH, Bosnia and Herzegovina could offer valuable insights into how to manage fuel loads and promote ecosystem health. Additionally, exploring the socio-economic dimensions of fire management – such as the role of local knowledge and practices – can empower communities and enhance collective efforts in landscape fire management.

Scientific research related to landscape fire management in FBiH, Bosnia and Herzegovina, are important in understanding fire dynamics and developing effective management strategies. By harnessing the knowledge gleaned from ongoing studies, FBiH, Bosnia and Herzegovina can create policies that not only mitigate fire risks but also leverage the ecological benefits of fire within its diverse landscapes. Collaboration between researchers, policymakers, and community members will be essential in shaping a resilient and sustainable approach to landscape fire management in the region. Finally, scientific research supporting LFM in FBiH, Bosnia and Herzegovina, should prioritize applied fields directly linked to landscape fire risk reduction and decision-making, including fuel mapping and assessment, fire behaviour modelling and climate change adaptation related to increasing fire danger. These research areas provide the scientific basis for preventive planning, early warning, and targeted mitigation measures. Research activities may be carried out in cooperation with relevant institutions in FBiH, Bosnia and Herzegovina, including universities and faculties of forestry, agriculture, natural sciences, as well as research institutes, hydrometeorological services, and professional public institutions involved in forestry, environmental protection, and civil protection with support of Regional Fire Monitoring Centre through LFMWB Programme. Strengthening links between scientific research and operational LFM practice is essential to ensure that research outputs are effectively translated into policy and field-level application.

2.5 Intersectoral cooperation

Intersectoral cooperation is key to improving the effectiveness and efficiency of landscape fire management efforts in the FBiH, Bosnia and Herzegovina. This cooperation necessitates collaboration among various stakeholders, including governmental institutions, non-governmental organizations, local communities, each contributing unique expertise and resources to mitigate the risks posed by landscape

fires. Through integrated efforts, the FBiH, Bosnia and Herzegovina can enhance its resilience against the increasing threat of wildfires exacerbated by climate change and changing land use patterns. One of the key components of successful intersectoral cooperation within the FBiH, Bosnia and Herzegovina is the Landscape Fire Management in the Western Balkans (LFMWB) programme. This programme serves as a central hub for coordination and communication among diverse stakeholders involved in landscape fire management. By bringing together representatives from forestry, agriculture, emergency services, environmental agencies, and local governments, the LFMWB fosters a collaborative atmosphere where knowledge, best practices, and resources are shared. The LFMWB structured approach to fire risk assessment, prevention, and response is important in establishing a unified strategy for landscape fire management that addresses the specific needs and challenges of different sectors.

The LFM network in FBiH - Bosnia and Herzegovina further enhances intersectoral cooperation by creating a multidisciplinary platform where various institutions can engage in dialogue and partnership. This network includes not only governmental entities but also academic institutions, NGOs, and community organizations, each contributing their unique perspectives and capacities to the overarching goal of landscape fire prevention and management. The richness of this diversity ensures that fire management strategies are not only scientifically sound but also socially inclusive and ecologically sustainable.

Furthermore, the diverse composition of the LFM network enables the incorporation of local knowledge and community practices into formal landscape fire management strategies. Engaging local communities is essential, as they often serve as the first line of defence against wildfires, possessing an intimate understanding of their landscapes and the preventive measures that work best in their unique contexts. By leveraging local insights, the LFM network can optimize its strategies, ensuring they are culturally sensitive and practically applicable on the ground.

The importance of capacity-building initiatives cannot be overstated. The LFMWB programme, along with the LFM network, emphasizes training and education for all stakeholders involved in landscape fire management. Workshops and trainings are conducted to empower local communities, equip fire management personnel with necessary skills, and promote awareness around landscape fire prevention and response. These efforts contribute to a culture of preparedness, where all sectors are aware of their roles and responsibilities in combating landscape fires.

In summary, fostering intersectoral cooperation for landscape fire management in the FBiH is essential for developing strategy that addresses the complexities of landscape fires. The LFMWB programme and the LFM network serve as platforms for collaboration, enabling diverse institutions to work together efficiently. Through these initiatives, the FBiH, Bosnia and Herzegovina not only enhances its capability to manage landscape fires but also ensures that all voices are heard and considerations are integrated, ultimately leading to more resilient communities and healthier ecosystems. The path forward relies on sustained commitment, continuous engagement, and the strengthening of partnerships across sectors to build a landscape fire management strategy that can adapt to the ever-changing environmental landscape.

3. LFM AND THE ENVIRONMENT

3.1 Protective role of landscapes

Landscapes generally mitigate the effects of landscape fires and promoting ecosystem resilience. As natural systems that encompass a variety of ecosystems, topographies, and biophysical features, landscapes are integral to the LFM framework. Understanding their protective qualities is essential to developing effective strategies that enhance ecological health and community safety. One of the primary protective roles of landscapes is their capacity to act as barriers against the spread of LFs. Features such as rivers, wetlands, and varied topography can serve as natural firebreaks, slowing down or even halting the progress of fire. Dense vegetation, when managed sustainably, can also help in fire prevention by maintaining soil moisture and reducing the likelihood of ignition. Properly designed landscapes that incorporate a mix of vegetation types can create a mosaic effect that disrupts continuous fuel sources, thereby reducing fire intensity and spread.

Also, landscapes contribute to fire risk reduction through their influence on microclimates. Forests, grasslands, and shrublands can alter local weather patterns, such as humidity and wind speed, which are critical factors in fire behaviour. For instance, in some country areas and types of forest, densely wooded areas can decrease wind speed and create cooler microenvironments, effectively reducing the likelihood of fire ignition and spread. This phenomenon highlights the importance of preserving diverse landscapes that can collectively work to manage and mediate fire risks.

In addition to their physical properties, landscapes provide significant ecological services that support the LFM. Healthy ecosystems are more resilient to fire and can recover more quickly after a fire event. Moreover, landscapes in FBiH, Bosnia and Herzegovina hold cultural and social significance, impacting local communities who rely on them for their livelihoods. Indigenous practices and traditional ecological knowledge often emphasize sustainable land management strategies that enhance the resilience of landscapes against LFs. Integrating these practices into contemporary fire management strategies can enhance both the cultural preservation and ecological integrity of landscapes.

Lastly, the protective role of landscapes extends far beyond fire LFM, they also serve as critical carbon sinks, contributing to climate change mitigation. Healthy landscapes can sequester carbon dioxide, helping to regulate the global climate. As climate change increases the frequency and severity of landscape fires, fostering resilient landscapes becomes even more imperative in the fight against climate-related disasters.

The protective role of landscapes is multifaceted, involving ecological, cultural, and climate-related dimensions. Effective LFM requires a holistic approach that recognizes the interconnectedness of these elements. By promoting resilient landscapes through sustainable management practices, we can enhance their protective features, reduce the impact of landscape fires, and ultimately safeguard the environment and the communities that rely on these ecosystems. To effectively integrate these insights into landscape fire management strategy, collaboration among stakeholders, including policymakers and local communities, is paramount.

3.2 Preservation of biodiversity

Biodiversity within landscapes plays a very important role; a diverse array of species can enhance ecosystem functions, such as soil stabilization, nutrient cycling, and water retention. These functions are

especially important during and after fires, as they contribute to the overall recovery of the landscape and prevent soil erosion, which is a common consequence of fire events.

Preservation of biodiversity is an essential component of effective landscape fire management, particularly in the context of FBiH, Bosnia and Herzegovina, where diverse ecosystems and rich biological resources face threats from both landscape fires and climate change. The unique geographical and climatic conditions of the FBiH, Bosnia and Herzegovina offer a habitat for a wide array of flora and fauna, making biodiversity conservation important not only for ecological balance but also for the sustainability of local communities and their economies.

Diverse habitats – such as different types of forests, grasslands, and wetlands – act as buffers that can absorb the impacts of fire. Loss of biodiversity can lead to increased susceptibility to LFs, as monocultures and degraded landscapes offer more continuous fuels and less ecological resilience.

In the FBiH, Bosnia and Herzegovina, landscape fire management must prioritize the preservation of native species and habitats to create resilient ecosystems capable of withstanding and recovering from fire events. This involves implementing practices that not only focus on fire suppression but also promote ecological balance. For instance, the integration of prescribed burns can help to manage fuel loads and promote the growth of fire-adapted species, thereby maintaining biodiversity while reducing the risk of catastrophic landscape fires.

Educating local communities about the importance of biodiversity in landscape fire management is also critical. Communities that rely on the land for their livelihoods often possess traditional ecological knowledge that can be invaluable in LFM practices. By involving local populations in conservation efforts, land managers can leverage indigenous knowledge to enhance both biodiversity preservation and fire risk reduction. This collaborative approach fosters a sense of ownership and responsibility among community members in maintaining their environment.

Also, the role of protected areas in the FBiH, Bosnia and Herzegovina, cannot be overstated. The establishment and effective management of national parks and nature reserves are essential for safeguarding habitats and species, while also providing opportunities for eco-tourism and conservation education. These areas serve as refuges for many species, particularly those that are endemic or threatened. Landscape fire management plans within these protected regions must prioritize not only the prevention of unwanted fires but also the protection of biodiversity and the maintenance of ecological integrity.

The preservation of biodiversity is a fundamental aspect of landscape fire management in the FBiH, Bosnia and Herzegovina. By integrating biodiversity conservation into LFM, the region can enhance ecosystem resilience and foster sustainable practices that protect its rich natural heritage. A holistic approach, involving collaboration among stakeholders, local communities, and conservation experts, is essential to effectively address the challenges posed by landscape fires and climate change, ensuring a balanced and thriving ecosystem for future generations.

In the end, landscape fires influence habitats, species composition, and ecosystem resilience, meaning that well-planned prevention and response measures can help avoid large-scale ecosystem degradation and long-term loss of biodiversity. The strategy therefore recognizes biodiversity as a relevant cross-cutting theme, in line with global frameworks such as the Convention on Biological Diversity (CBD) and the Kunming-Montreal Global Biodiversity Framework, as well as the UN Sustainable Development Goals. While biodiversity protection is not the primary objective of LFM, integrating basic ecosystem considerations into prevention, land management, and post-fire recovery supports sustainable landscapes and strengthens climate and ecological resilience.

3.3 LFM and climate change

LFM is recognized as a component in addressing environmental challenges posed by climate change, in Western Balkan region, as well as in FBiH, Bosnia and Herzegovina. The interplay between changing climate patterns and landscape fires is becoming more evident, as severe weather events, prolonged droughts, and elevated temperatures lead to a higher frequency and intensity of LFs. Understanding and adapting LFM in response to these evolving conditions is essential for ecological balance and protecting biodiversity.

Bosnia and Herzegovina is under threat from climate change, which is projected to result in patterns of climate variability that exacerbate the risk of LFs. Long-term climate models suggest an increase in average temperatures ranging from 1.5°C to 3°C by the end of the 21st century, alongside changes in precipitation patterns, with drier summers and wetter winters. These conditions create an environment conducive to LFs, particularly in the mountainous and forested regions of the country, such as the Dinaric Alps. As forests are key ecosystems for biodiversity and carbon storage, their susceptibility to fire due to climate change could compromise ecological integrity and contribute to greater greenhouse gas emissions.

The Mediterranean climate influence exacerbates the fire risk in BiH, with dry periods in summer facilitating the ignition and spread of fires across bushes and forests. As such, the countries in the region, including BiH, are experiencing an increased incidence of LFs, presenting a pressing need for comprehensive LFM policies that consider both prevention and response strategies in light of these climate scenarios.

The changing climate not only influences the frequency of landscape fires but also alters fire behaviour and severity. Changes in vegetation composition due to climate stressors can lead to the proliferation of fire-prone species, which may burn more readily than native flora. Furthermore, the interdependence of land uses – such as agriculture, forestry, and urban development – must be taken into account in LFM to understand how land management practices can affect and be affected by climate change.

Given the rising risks associated with climate change, incorporating adaptive management LFM is needed. This includes:

Fire Prevention: Developing comprehensive fire prevention plans that involve community engagement and education, promoting awareness of fire risks, and establishing fire bans during high-risk conditions. Active participation from local communities can enhance the effectiveness of fire prevention strategies.

Fuel Management: Implementing measures such as controlled burns and mechanical fuel reduction to manage vegetation and decrease fuel loads in fire-prone areas. This includes not only forests but also grasslands and shrublands that are susceptible to LFs.

Monitoring and Early Warning Systems: Establishing monitoring and early warning systems to identify potential LF risks based on climatic data can help inform timely interventions.

Restoration of Fire-Adapted Ecosystems: Promoting the restoration of fire-adapted ecosystems that have historically co-evolved with fire helps enhance ecological resilience. This could involve reintroducing traditional land management practices, such as grazing and selective logging, that maintain biodiversity while preventing fuels from accumulating to dangerous levels.

Cross-Sectoral Integration: LFM in FBiH, Bosnia and Herzegovina must not only involve forestry agencies but also consider agricultural, urban, and environmental sectors. Integrating LFM into regional planning and sustainable development frameworks can help foster a communal approach to managing fire risk while recognizing diverse land use impacts.

Climate-Smart Practices: Adopting climate-smart land management practices that enhance the resilience of landscapes while also providing economic benefits to local populations is essential. This can include agroforestry, sustainable forestry management, and promoting ecosystems services.

Landscape fire management in the context of climate change is a multidimensional challenge that requires proactive, informed action and collaboration across various stakeholders in FBiH, Bosnia and Herzegovina. As climate scenarios predict increasing fire risks, the implementation of adaptive LFM strategy will not only mitigate the immediate dangers of LFs but also contribute to greater ecological health and resilience in the long term. By addressing the interconnectedness of climate change and landscape fire management, FBiH, Bosnia and Herzegovina, can build a more sustainable future that balances environmental needs with the socio-economic realities of its population. Effective LFM serves as both a response to current challenges and a prevention strategy for future climate-induced disasters.

In summary, climate change policy in Bosnia and Herzegovina is guided by a set of key national and international framework documents that define priorities for mitigation, adaptation, and reporting obligations. Central reference documents include Bosnia and Herzegovina's commitments under the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, as well as the country's official National Communications and Biennial Update Reports submitted to the UNFCCC. In addition, climate change is addressed through strategic planning instruments such as entity-level environmental protection strategies, relevant sectoral strategies (energy, forestry, agriculture, water management), and the broader EU integration process, which requires gradual alignment with EU climate and energy acquis. Together, these documents provide the policy basis for strengthening resilience and mainstreaming climate considerations into sectors affected by increasing climate-related risks, including landscape fire management.

4. LANDSCAPE FIRE MANAGEMENT AND THE SOCIO-ECONOMIC ASPECTS

4.1 The contribution of LFM to rural development, poverty reduction, well-being and livelihoods of local communities

As rural areas face abandonment and overgrowth of agricultural lands, which in turn heightens the risk of landscape fires, effective LFM can serve as a catalyst for revitalizing these areas. This chapter explores how LFM can mitigate these risks while simultaneously contributing to economic development and enhanced livelihoods.

FBiH, Bosnia and Herzegovina, has witnessed substantial rural depopulation, wherein younger generations migrate towards urban centres and other more developed European countries in search of better educational and employment opportunities. This shift leads to an overgrowth of previously cultivated lands, increasing fire hazards and negatively impacting ecosystem health. In this context, LFM serves as an integral tool for rural development by promoting sustainable land use practices and community engagement. By minimizing the risk of landscape fires through LFM approach, agricultural productivity will be improved, ensuring that farmers can cultivate their lands more effectively and with less uncertainty about potential fire damage. Sustainable agricultural practices that are fortified by LFM can lead to improved crop yields and stable incomes, thereby reducing poverty in rural communities.

LFM necessitates the involvement of local communities. Training programmes aimed at educating rural population about fire risk and sustainable land practices can foster a sense of ownership and responsibility towards their environment. This communal engagement not only builds capacity within rural populations but also stimulates social cohesion, which is vital in underpopulated areas.

The relationship between LFM and poverty reduction is especially pertinent in FBiH, Bosnia and Herzegovina, where economic opportunities are often limited. By incorporating LFM into rural development initiatives, communities can experience a variety of poverty alleviation benefits.

Job Creation and Economic Diversification: Implementing LFM requires local labour for tasks such as vegetation management and monitoring fire-prone areas. This creates job opportunities that can reduce unemployment rates in rural communities. Furthermore, a robust fire management system can attract eco-tourism, providing additional sources of income through activities like guided tours, educational workshops, and outdoor recreation.

Value-Added Products: Sustainable land management practices fostered by LFM can result in the production of non-timber forest products such as honey, mushrooms, and medicinal plants. By diversifying economic activities, local communities can develop additional streams of income that bolster financial security and resilience against market fluctuations.

The well-being of rural communities in the FBiH, Bosnia and Herzegovina, is intricately tied to their environment. When landscapes are poorly managed, the risk of fires heightens, threatening livelihoods and community health. LFM directly contributes to enhancing well-being.

By reducing the frequency and severity of landscape fires through proactive LFM, it safeguards biodiversity and ecosystem services that are crucial for agriculture, water supplies, and overall community health. Healthy ecosystems provide essential services such as crop pollination, water filtration, and soil fertility, which are imperative for sustaining rural livelihoods. LFM can also help preserve cultural practices and local knowledge surrounding land use. Engaging traditional methods of land management alongside modern LFM approaches can foster a sense of identity and pride in local communities. The celebration of communal efforts to manage landscapes fosters social ties and enhances community resilience in the face of environmental challenges.

In the end, by developing safer, well-managed landscapes, communities can enjoy recreational areas that promote physical and mental well-being. Improved access to natural resources, such as firewood and forage, also enhances the quality of life for rural residents, directly affecting their health and happiness.

5. LINKING LFM STRATEGY WITH THE REGIONAL AND INTERNATIONAL CONTEXT

5.1 Regional collaboration

The Western Balkan region is characterized by similar ecosystems and socio-economic challenges, necessitating a unified approach to address the increasing threat of landscape fires. The LFMWB Programme stands out as a collaborative effort among various partner institutions, particularly the Ministries of Agriculture and Forestry in the Western Balkan countries. By bringing together these key governmental bodies, the programme facilitates a strategic framework that emphasizes shared responsibilities, best practices, and collective actions in landscape fire prevention and management. Through regular workshops, training sessions, and knowledge-sharing platforms, these ministries work hand-in-hand to develop and implement LFM principles tailored to the unique environmental contexts of each country, while also promoting regional coherence.

Moreover, the establishment of a Regional Landscape Fire Management Network further bolsters the effectiveness of this collaboration. This network led by the Regional Fire Monitoring Centre (RFMC) not only serves as a platform for ongoing dialogue and exchange of experiences but also enhances the capacity of local institutions to respond effectively to fire incidents. By leveraging the expertise of various stakeholders, including institutions, researchers, local communities, and NGOs, the network cultivates a comprehensive understanding of fire behaviour, risk assessment, and impact mitigation strategies. Collaborative initiatives, funded under the LFMWB programme, have led to the development of innovative methods and LFM approach, thus equipping governments with the necessary tools to implement prevention measures.

The synergy created through the LFMWB programme exemplifies the significance of regional collaboration in addressing common challenges posed by landscape fires. It underscores the importance of coordinated approaches in leveraging resources, sharing knowledge, and enhancing the resilience of communities across the Western Balkans. As various ministries align their objectives and strategies, they not only strengthen their individual capacities but also contribute to the overall stability and sustainability of the region's ecosystems.

LFMWB project and the Regional Landscape Fire Management Network demonstrate the essential role of regional collaboration in developing effective LFM. By fostering cooperation among relevant institutions and stakeholders, the Western Balkans position themselves to tackle landscape fires more efficiently, thereby ensuring a safer, more sustainable future for their diverse landscapes and populations. The commitment to collective action underlines not only the shared challenges faced by the region but also the potential for mutual growth and resilience in the face of environmental threats.

5.2 International collaboration

International collaboration is also implemented within the framework of the LFMWB programme. One of the key components of this initiative is its partnership with the Global Fire Monitoring Centre (GFMC),

which provides invaluable support in developing effective methodologies tailored to the unique challenges faced by the Western Balkans. By aligning with international standards and best practices, the LFMWB programme ensures that its work is not only regionally relevant but also globally informed.

As part of this collaborative effort, the LFMWB programme has organized a series of joint workshops that bring together international landscape fire experts from countries such as Greece, Turkey, and the USA. These workshops facilitate knowledge exchange on landscape fire management techniques, risk assessment methodologies, and innovative response strategies. Experts share their experiences and insights, empowering regional partners with the latest advancements in fire prediction, prevention, and mitigation. This exchange not only enhances the technical capabilities of Western Balkan countries but also fosters a sense of global community and shared purpose in tackling the challenges posed by landscape fires.

The outcomes of these international collaborations are significant. They enable the Western Balkan nations to adopt best practices that have been successfully implemented in diverse environmental contexts, thereby improving their resilience to landscape fire incidents. Furthermore, continuous engagement with international experts enriches the dialogue on landscape fire management, promoting adaptive learning and flexibility in their implementation.

6. PESTLE ANALYSIS

In the context of landscape fire management, it is essential to adopt a comprehensive and systematic approach to understand the multifaceted dynamics that influence decision-making and strategic planning. The PESTLE analysis, which examines the Political, Economic, Social, Technological, Legal, and Environmental factors, serves as a tool for this purpose.

Conducting a PESTLE analysis for a LFM Strategy enables stakeholders to identify and assess the external factors that can impact the effectiveness and sustainability of LFM practices. By exploring the political factors, such as legislative frameworks and government policies, stakeholders can align their strategies with current regulations and advocate for necessary reforms. The economic component evaluates funding opportunities and resource allocation, providing insights into the financial viability of fire management initiatives.

Social factors reflect the attitudes and behaviours of communities toward LFM, which is crucial in fostering collaboration and public support. Technological advancements present opportunities for innovative solutions in monitoring, prevention, and response, while legal considerations ensure compliance with relevant laws and regulations. Finally, the environmental aspect underscores the importance of understanding ecological systems and their resilience to landscape fires.

POLITICAL FACTORS

- **Lack of coordination among institutions (federal, cantonal, and municipal levels)** – Disconnection between responsibilities and mandates at the state, entity, cantonal, and municipal levels results in inefficient cooperation, overlapping roles, and slow decision-making in LFM and forestry management.
- **Unharmonized legislation** – Legal frameworks regulating forestry, fire protection, and environmental management remain inconsistent across administrative levels, creating operational gaps and limiting the effectiveness of fire prevention and response mechanisms.
- **Insufficient enforcement of existing legal regulations** – Even where legal provisions exist, implementation and enforcement are often weak due to administrative bottlenecks, insufficient oversight, and lack of clear accountability mechanisms.
- **Lack of political commitment to key legal reforms** – The prolonged failure to adopt a comprehensive Law on Forests at the Federation of BiH level demonstrates a lack of sustained political will to establish an integrated and coherent governance system for forestry and fire management. Delays in adopting sector-relevant regulations. Low political prioritization hinders the adoption of essential by-laws and regulations in forestry, fire prevention, and emergency management, slowing down alignment with EU standards and best practices.
- **Decision-making not grounded in scientific evidence** – Certain regulatory decisions – such as the adoption of new forest order rules that disregard established scientific and silvicultural standards – undermine the quality and sustainability of forest management and increase long-term LFM risks.

ECONOMICAL FACTORS

- **Lack of financial resources for purchasing firefighting equipment** – Limited financial resources restrict the procurement of modern firefighting vehicles, tools, protective gear and early detection technologies, reducing overall preparedness and response capacity.

Absence of development programmes for the preservation of rural communities – The absence of targeted initiatives to support rural livelihoods contributes to depopulation, land abandonment and reduced community engagement in forest and landscape management – factors that increase fire risk.

- **Lack of firefighters and inspectors for firefighting** – Financial constraints hinder the recruitment and retention of professional firefighters, forestry inspectors, and other essential operational staff, creating gaps in prevention, monitoring, and response.
- **Lack of a standardized system for economic assessment of fire impacts** – There is a lack of a unified methodology for calculating direct and indirect economic losses from landscape fires, which limits evidence-based planning, prioritization, and resource allocation.
- **Insufficient funds for demining in fire-prone areas** – Uncleared mine-contaminated zones not only increase risks for firefighters but also restrict the implementation of prevention measures and post-fire restoration efforts.
- **Absence of programmes for the quality restoration of burned areas** – Post-fire rehabilitation – including reforestation, erosion control, and biodiversity recovery – is inadequately financed, prolonging environmental degradation and increasing long-term vulnerability.
- **Inadequate forest road networks** – Insufficient investment in forest transport infrastructure limits access for firefighting units and delays rapid interventions during high-risk periods.
- **Lack of financial resources for modern equipment (cameras, drones)** – Budgets at entity, cantonal, and municipal levels often do not allow the acquisition of advanced surveillance tools such as drones, cameras, and remote sensing systems that are crucial for early detection.
- **Underinvestment in fire prevention programmes** – Prevention activities – such as awareness campaigns, community training, controlled burning programmes, and fuel management – are largely unfunded or implemented sporadically.
- **Low utilization of available resources** – Despite the availability of international funding opportunities, national institutions often lack the capacity or coordination to absorb and channel these resources effectively toward LFM priorities.

SOCIAL FACTORS

- **Demographic changes and rural depopulation** – Continued migration from rural to urban areas leads to land abandonment, reduced community stewardship of forests and agricultural landscapes, and diminished local capacity for early detection and rapid response to wildfires.
- **Low public awareness about use of fire as a tool in agricultural practices** – A significant share of the population remains unaware of the dangers associated with open burning, stubble burning, and other traditional land-management practices, contributing to a high incidence of human-caused fires.
- **Lack of a prevention system and participatory involvement of local communities** – Local communities are insufficiently involved in fire-prevention planning, volunteer firefighting structures, and participatory land management. The lack of organized and continuous community-based prevention systems weakens resilience at the local level.
- **High social vulnerability of specific groups in society (cultural deficit)** – Elderly individuals, low-income households, and isolated rural communities face greater risks during landscape fires events due to limited mobility, insufficient resources, and lower access to information and pre-

paredness mechanisms. Social vulnerability also contributes to lower participation in prevention activities.

TECHNOLOGICAL FACTORS

- **Insufficient coverage with video surveillance** – The Federation of BiH lacks adequate deployment of fixed video-monitoring infrastructure, limiting real-time detection and early reporting of wildfire outbreaks in high-risk forest and agricultural areas.
- **Absence of satellite monitoring of forests and other landscapes** – There is no systematic use of satellite imagery or remote sensing platforms to track vegetation conditions, fuel loads, land-use changes, or active fire hotspots – hindering evidence-based risk assessment and strategic planning.
- **Low utilization of drones for surveillance and incident reporting** – Although drone technology is increasingly accessible, its operational use for mapping, patrolling, and documenting fire events remains very limited, largely due to financial constraints, lack of trained staff, and insufficient operational protocols.
- **Weak investment in modern hydrometeorological equipment** – The scarcity of automatic weather stations and advanced meteorological sensors reduces the accuracy of fire-danger forecasts and limits the ability to develop predictive fire-risk models aligned with EU standards.
- **Outdated firefighting equipment** – Many firefighting units continue to rely on old or insufficiently maintained vehicles, pumps, protective gear, and communication tools, which affects both the effectiveness of interventions and the safety of personnel.
- **Absence of integrated early warning system comprehensive early warning system** – The integration of meteorological alerts, fire-danger indices, community notification channels, and real-time monitoring has not yet been achieved, which limits the ability to respond proactively to rising fire risks.

LEGAL FACTORS

- **Lack of federal law on forests** – The lack of comprehensive Federal Law on Forests creates structural gaps in governance, weakens strategic planning, and impedes coherent landscape fire management across cantons.
- **Inconsistencies and contradictions between sectoral laws** – Legislation related to agriculture, environmental protection, spatial planning, civil protection, and fire safety is often not harmonized, resulting in conflicting mandates and fragmented implementation.
- **Weak enforcement of existing laws and bylaws** – Although many legal provisions exist, their practical application is inconsistent due to insufficient monitoring, limited institutional capacities, and a lack of accountability mechanisms.
- **Overlapping and unclear institutional jurisdictions** – Ambiguities and conflicts between the responsibilities of state, entity, cantonal, and municipal institutions lead to delays, duplication of efforts, and reduced efficiency in prevention, response, and post-fire recovery.
- **Inadequate penalties for violations related to fire use and forest management** – Existing sanctions do not sufficiently deter illegal burning, unsustainable forestry practices, or negligence, contributing to recurring human-caused landscape fire incidents.

- **Complex and slow public procurements procedures** – Lengthy administrative processes for procuring firefighting equipment, vehicles, and monitoring technologies delay modernization efforts and reduce operational readiness during fire seasons.
- **Lack of demining programmes** – Mine-contaminated areas remain a major obstacle for implementing prevention measures, conducting safe interventions, and restoring burned landscapes, yet current legislation and financing mechanisms do not adequately address this challenge.

ECOLOGICAL FACTORS

- **Intensifying impacts of climate change** – Rising temperatures, prolonged droughts, and increasingly frequent extreme weather events significantly elevate landscape fire risk and extend the fire season, placing additional pressure on already vulnerable forest ecosystems.
- **Loss of biodiversity and degradation of habitats** – Recurrent fires, habitat fragmentation, and land degradation contribute to the loss of species diversity, reducing the natural resilience of ecosystems and their capacity to recover after fire events. Landscape fires lead to the destruction of critical habitats, threatening protected and endemic species and undermining long-term conservation goals.
- **Deterioration of air and water quality** – Smoke pollution from frequent fires lowers air quality, while post-fire erosion and sediment runoff negatively affect water courses, reservoirs, and drinking water sources.
- **Poor management of private forests** – Inadequate silvicultural practices, limited investment, and low owner engagement in fire prevention contribute to fuel accumulation and increase the overall landscape-level fire risk. This alters forest structure and ecological conditions, increasing the likelihood, intensity, and spread of landscape fires at the landscape level.

SWOT analysis

This chapter presents the SWOT analysis developed to support the preparation of the LFM report for the FBiH, Bosnia and Herzegovina. The SWOT methodology was applied as a structured analytical tool to identify key strengths and weaknesses within the current LFM system, as well as the external opportunities and threats that influence future development and implementation of integrated landscape fire management in FBiH, Bosnia and Herzegovina. The purpose of this analysis is to provide an evidence-based foundation for defining strategic priorities and ensuring that proposed measures respond directly to the most relevant institutional, operational, and environmental challenges.

The SWOT analysis was prepared through a participatory process during the 2nd LFM Workshop in FBiH, bringing together representatives of relevant federal and cantonal institutions involved in fire prevention, preparedness, response and related sectors. Workshop participants jointly reviewed and validated the main issues affecting LFM in FBiH, Bosnia and Herzegovina, ensuring that the SWOT reflects real operational experience and institutional perspectives. The analysis is further based on findings from the LFM FBiH Report, from which key conclusions and contextual data were incorporated to strengthen the analytical basis and ensure consistency between the assessment of the current situation and the strategic planning process.

STRENGTHS	WEAKNESSES
– The existence of legal framework including laws and bylaws in the field of fire protection – Existing procedures including operational fire protection plans – Awareness-raising campaigns – Abundant water resources – Sufficient number of experts in the field of fire protection – Institutional capacities – Existing intersectoral communication	– Lack of the Law on Forests of the Federation of Bosnia and Herzegovina – Population migrations (from rural to urban areas, and migrations to other countries) – Lack of a Forestry Programme in the Federation of Bosnia and Herzegovina – Complex organizational setup of the socio-political system – Lack of human and material resources – Lack of effective communication between certain competent institutions within the system – Inadequate implementation of existing laws – Inadequate penal policies – Unresolved property disputes – Water source network – Lack of public awareness – Lack of awareness of decision makers – Underdeveloped tourist infrastructure and rural development at the local level – Difference between the cadastral records and the actual on-site conditions

OPPORTUNITIES	THREATS
– Developing awareness-raising programmes about landscape fire protection – Rural development – Introducing LFM principles into the educational system – Introducing digital technologies in prevention measures – Utilization of EU funds (pre-accession and international funds) – Increase of capacity in terms of LFM – Creation of Record of known offenders – Modernization and innovation of fire protection monitoring – introduction of prescribed burning practices – Adoption of the Law on Forests of the Federation of Bosnia and Herzegovina	– Climate change (temperature extremes, air pollution) – Population migration – Increased landscape fire occurrence and intensity – Inconsistent implementation of policies related to LFM – Large number of illegal dumpsites – Inadequate identification of offenders and their failure to be prosecuted – Large areas of the FBiH, Bosnia and Herzegovina, contaminated with mines

7. VISION, STRATEGIC OBJECTIVES AND SPECIFIC GOALS

The vision of FBiH, Bosnia and Herzegovina LFM Strategy is as follows:

"The Federation of Bosnia and Herzegovina is a prepared and resilient society that effectively prevents, manages, and recovers from landscape fires through integrated, science-based, politically and socially responsible risk management that protect lives, property, biodiversity and natural resources"

The strategic objectives are as follows:

1. Improvement of the legal framework in the field of fire protection and strengthening of implementation in accordance with international standards,
2. Strengthening technological, institutional, and human capacities for landscape fire management,
3. Raising public awareness about the risks and responsibilities in landscape fire protection.

8. TRANSFORMATION OF THE LFM STRATEGY INTO ACTION

The effective implementation of the LFM Strategy of FBiH, Bosnia and Herzegovina requires its systematic transformation from a strategic framework into concrete, coordinated, and measurable actions. This chapter defines the mechanisms, instruments, and institutional arrangements through which the strategic objectives and measures will be operationalized, ensuring consistency across federal, cantonal, and local levels of governance.

The implementation of the LFM Strategy will be carried out through action plan, developed by the competent federal and cantonal institutions. These action plan will translate strategic objectives into specific activities, clearly defining responsibilities, timelines, financial resources, and performance indicators. Given the complex administrative structure of FBiH, Bosnia and Herzegovina, particular attention will be paid to ensuring vertical coordination between the federation and cantons, as well as horizontal coordination among institutions responsible for fire protection, forestry, agriculture, environmental protection, civil protection, and spatial planning.

Each action plan will prioritize measures based on fire risk, vulnerability of landscapes and available capacities. Special emphasis will be placed on high-risk areas affected by recurring landscape fires, land abandonment, unclear ownership, and insufficient preventive management.

The transformation of the strategy into action relies on clearly defined institutional roles. Federal level institutions will be responsible for strategic coordination, legislative initiatives, development of methodologies, data systems, and reporting, while cantonal authorities will play a central role in implementation, enforcement, and operational planning in line with their constitutional competencies. To ensure effective coordination, inter-institutional working bodies will be established or strengthened, involving representatives of relevant federal ministries, cantonal authorities, professional services, and public institutions. These bodies will support harmonization of policies and legislation related to LFM, facilitate information exchange, and monitor implementation progress. Municipal and local authorities, as well as fire and rescue services, forestry enterprises, land management bodies, and civil protection structures, will be actively involved in the execution of preventive and preparedness measures, early detection, response, and post-fire recovery activities.

The implementation of the LFM Strategy will be supported through a combination of federal and cantonal budgets and external financial sources. Dedicated budget lines for fire prevention, landscape management, and capacity building will be promoted to ensure sustainability and predictability of funding.

In addition to public funding, opportunities for mobilizing international assistance and EU funds will be actively pursued, particularly for investments in digital systems, monitoring technologies, capacity development, and pilot projects demonstrating integrated LFM approaches. Synergies with related strategies and sectoral programmes will be sought to maximize the efficient use of resources.

A structured monitoring and reporting system will be established to track progress in the implementation of the LFM Strategy. Monitoring will be based on clearly defined indicators linked to each strategic objective, measure, and activity. These indicators will cover inputs, outputs, and results, enabling both quantitative and qualitative assessment of implementation. Regular reporting will be conducted at the cantonal and federal levels, with consolidated annual implementation reports prepared at the federal level. These reports will assess achievements, identify challenges and delays, and propose corrective measures where

necessary. The establishment of a centralized digital database for landscape fire monitoring and reporting will play a key role in providing reliable data to support evidence-based decision-making.

Successful transformation of the LFM Strategy into action requires continuous investment in institutional and human capacities. Training programmes will be developed for staff at all levels, focusing on fire prevention, integrated landscape management, data collection and analysis, risk assessment, and inter-sectoral cooperation. Knowledge exchange and dissemination of good practices will be promoted through workshops, guidelines, and cooperation with academic and research institutions. Particular attention will be given to strengthening capacities at the cantonal and local levels, where operational responsibilities for LFM are most pronounced.

9. ACTION PLAN OF LFM

Activities	Implementation period	Competent institution	Partners	Budget BAM
Strategic objective 1. Improvement of the legal framework for fire protection and strengthening its implementation in line with international standards				
1.1 Comprehensive review and harmonisation of legislation related to LFM at both federal and cantonal levels	2 years	Ministry of Internal Affairs FBiH, Ministry of Justice FBiH	FCPA, CCPAs, FMAWF, NGOs,	-
1.2 Drafting a new Fire Protection Law and separation of the Fire Protection Law from the Firefighting Law	9 months	Ministry of Internal Affairs FBiH, Ministry of Justice FBiH	FCPA, CCPAs, FMAWF, NGOs,	100,000
1.3 Creation of digital LF database and system for monitoring and reporting	3 years	Ministry of Security BiH, Government of FBiH	FCPA, CCPAs, FMAWF, NGOs, Education intuitions	100,000
1.4 Membership in international networks (CTIF)	2 years	Ministry of Security BiH, Government of FBiH	FCPA, CCPAs, FMAWF, NGOs, Education intuitions	1,000,000
1.5 Update of cadastral register data	3 years	Federal Administration for Geodetic and Property Legal Affairs	Municipality cadastres	-

Activities	Implementation period	Competent institution	Partners	Budget BAM
Strategic objective 2. Strengthening technological, institutional, and human capacities for landscape fire management				
Procurement of equipment for satellite monitoring, early warning, and surveillance (cameras, drones)	3-5 years	Government of FBiH, FCPA,	CCPAs, Municipal civil protection services	15,000,000
Procurement of firefighting equipment (firefighting vehicles for extinguishing) LFs	5 years	Municipal civil protection services	Forestry companies, FCPA, CCPAs	30,000,000

Procurement of aircraft for extinguishing LF's (air tractors)	5 years	Government of FBiH	Cantonal governments, BHANSA	30,000,000
Chartering aircrafts (air tractors)	1 year	Government of FBiH	Cantonal governments, BHANSA	5,000,000
Establishment of a centre for training and education of firefighting personnel	7 years	Government of FBiH, FCPA	Cantonal governments, CCPAs	10,000,000
Knowledge exchange at the international level, organization of scientific conferences in the Western Balkans	Continuously	FCPA, CCPAs	Partners from the region	500,000
Development of a fire risk map, procurement of equipment for early fire detection, development of regulations on procedures to follow in case of landscape fire incidents	3 years	FCPA, FMAWF	-	-
Strengthening intersectoral cooperation on the level of FBiH by establishment and operationalization of a formal intersectoral coordination mechanism at the level of FBiH for landscape fire management, including regular coordination meetings, information exchange, and joint planning among relevant institutions and stakeholders	Continuously	Ministries, agencies in FBiH	-	-
Establish international cooperation (EU + WB)	Continuously	FMAWF	FCPA, CCPAs	200.000

Activities	Implementation period	Competent institution	Partners	Budget BAM
Strategic objective 3. Raising public awareness about the risks and responsibilities in landscape fire protection				
Implementation of a comprehensive media campaign to raise awareness (TV programmes, thematic advertisements, digital promotional materials) Sub-activities: Organization of TV and radio show dedicated to LFM Creation of promotional video materials Creation of educational promo materials (digital and print)	7 years	Government of FBiH, FMAWF, FCPA	CCPAs, Faculty of Forestry, Cantonal ministries of forestry, NGOs	75,000/per year

Educational and training programmes specifically aimed at targeted groups (mountaineering associations, hunting societies, mountain rescue services, agricultural associations, private forest owners) Sub-activities: Simulation of an emergency situation Open house days – firefighting units and civil protection	7 years	Government of FBiH, FMAWF, FCPA	KCPAs, Faculty of Forestry, NGOs, professional firefighting units, volunteer firefighting units	1,000,000
Education in primary and secondary schools – systematic introduction of LFM into the educational program Sub-activities: Change of the educational programme in primary and secondary schools Organization of quizzes and competitions on the topic of LFM	7 years	Government of FBiH, Ministry of Education	FMAWF, FCPA	20,000
Organization of volunteer actions for managing landscape fires Sub-activities: Organization of international practice trainings Organization of Study Tours on the LFM topic	7 years	FCPA, CCPAs	FMAWF	20,000
Development of an application for risks (fire weather index) and alerting	2 years	FCPA	CCPA, Cantonal forestry directorates	150,000

10. MONITORING

Measures/Activities	Baseline	Period of implementation	Direct results	Monitoring indicators
Strategic objective 1. Improvement of the legal framework for fire protection and strengthening its implementation in line with international standards				
Review and harmonization of legislation related to LFM across federal and cantonal level	Existing laws	2 years	Harmonized legislation related to LFM	Number of laws harmonized (cantonal and federal)
Analysis of current situation, drafting a new Fire Protection Law and separation of the Fire Protection Law from the Firefighting Law	Existing legal framework	2 years	Adopted new Fire Protections Law Adopted new Firefighting Law	Establishment of a multisectoral working group for separation of the Fire Protection and Firefighting Laws Number of stakeholders consulted Draft of a Fire Protection Law and draft of a Firefighting Law
Creation of digital database and system for data collecting and reporting of LFs		2 years	Digital LF database established LF and reporting system developed	Number of reporting templates adopted Number of trained users with system access User manuals and guidelines developed
Membership in international networks (CTIF)				
Updating cadastral records through field surveys and registering them in official land registers	Discrepancy between cadastral data and the actual on-site situation	3 years	Updated cadastral records Harmonized records between cadastre offices and land registry authorities	

Measures/ Activities	Baseline	Period of implementation	Direct results	Monitoring indicators
Strategic objective 2. Strengthening technological, institutional, and human capacities for landscape fire management				
Procurement of equipment for satellite monitoring, early warning, and surveillance (cameras, drones)	Existing system in 3 cantons JICA project- Forest Fire Information Systems in Western Balkans	3-5 years	Satellite monitoring and early warning equipment procured and operational Surveillance systems installed and functional	Number of detected fires with procured equipment At least one pilot project of procurement and use of equipment Procurement of automatic weather stations
Procurement of firefighting equipment (firefighting vehicles for extinguishing LFs)	Existing vehicles which are old	5 years	Firefighting vehicles and equipment for landscape fire suppression procured and delivered	Number of firefighting vehicles procured Number of vehicles distributed to cantonal/municipal units
Procurement of aircrafts for extinguishing LFs (air tractors)	No aircrafts, only helicopters owned by Armed Forces	5 years	Air tractors and helicopters procured and delivered	Number of purchased air tractors and helicopters (at least 2 air tractors and 1 helicopter) Number of extinguished LFs
Chartering aircrafts (air tractors)	A pilot project from the last season, also planned for the next fire season	3 years	Successfully extinguished LFs	Number of extinguished LFs (minimum 70 hours of flying according to the fire season)
Establishment of a centre for training and education of firefighting personnel	Existing experience and knowledge	7 years	Established centre for training and education of firefighting personnel Training infrastructure created Standardized training curriculum and modules developed, including specific modules for landscape fire management (LF prevention, use of equipment)	Training centre established. The centre exists and operates, financial sustainability of the centre has been established; Engagement of employed instructors – (minimum 5); Number of users of special and volunteer firefighting forces and foresters who are trained (every 2 years/7 days of training/minimum 150 personnel on an annual basis)

Knowledge exchange at the international level, organization of scientific conferences in the Western Balkans	Knowledge exchange exists About 200 personnel have participated in knowledge exchanges with Turkey, Croatia, and Montenegro	Continuously	International knowledge exchange mechanisms established Scientific and professional conferences on LFM topics organized	Increase by 20% of these international exchanges At least 3-5 events annually where Bosnia and Herzegovina is the host At least 30 people at conferences At least 200 individuals for joint exercises
Development of a fire risk map, procurement of equipment for early fire detection, development of regulations on procedures to follow in case of fire incidents	Existing forest protection plans	3 years	Fire risk map developed Early fire detection equipment procured, installed and operational Regulations/rule-books and standardized procedures adopted defining responsibilities, reporting lines, and operational steps to be followed during LF incidents across relevant institutions and levels (federal-cantonal-municipal)	Developed fire risk map at the level of the Federation of Bosnia and Herzegovina Procured and installed equipment for early fire detection Developed and adopted regulations on procedures to follow in case of fire incidents
Establish and operationalize a formal intersectoral coordination mechanism at the level of FBiH for landscape fire management, including regular coordination meetings, information exchange, and joint planning among relevant institutions and stakeholders	Existing cooperation, but not sufficient	Continuously	Formal intersectoral coordination mechanism established and functional	At least 2 inter-cantonal exercises annually Established mechanism for a unified database for data exchange
International cooperation (EU + WB)	BiH has signed agreements with all neighbouring countries for overflights (EU Civil Protection Mechanism - since 2022)	Continuously	FBiH institutions integrated into regional and EU coordination mechanisms Exchange of good practices and technical knowledge conducted (on WB level)	Number of attended international conferences and study visits

Measures/Activities	Baseline	Period of implementation	Direct results	Monitoring indicators
Strategic objective 3. Raising public awareness about the risks and responsibilities in landscape fire protection				
Implementation of a comprehensive media campaign to raise awareness (TV programmes, thematic advertisements, digital promotional materials) Sub-activities: Organization of TV and radio show dedicated to LFM Creation of promotional video materials Creation of educational promo materials (digital and print)	Partial campaign at the cantonal level	2 years	Raised awareness of people Lower number of LFs caused by human factors	Production of at least three different informational video productions on the topic of LFM Campaign reach of 40% of the total population 100 minutes of broadcast of thematic advertising
Educational and training programmes specifically aimed at targeted groups (mountaineering associations, hunting societies, mountain rescue services, agricultural associations, private forest owners) Sub-activities: Simulation of an emergency situation Open house days – firefighting units and civil protection	No information	2 years	Targeted LFM education and training programmes developed and delivered Improved awareness and practical knowledge among target groups	At least 1 manual created At least 10 educational workshops organized 300 educated people
Education in primary and secondary schools – systematic introduction of LFM into the educational program Sub-activities: Change of the educational programme in primary and secondary schools Organization of quizzes and competitions on the topic of LFM	Education in primary schools – led by CCPAs	2 years	LFM topics integrated into primary and secondary school curricula Teaching materials developed and distributed Improved knowledge and awareness among students in primary and high schools	2000 educated students in primary and high schools

Organizing volunteer actions for managing landscape fires Sub-activities: Organization of international practice trainings Organization of Study Tours on the LFM topic	No activities	2 years	Volunteer actions organized and implemented Strengthened community engagement and local community preparedness	At least 100 volunteers engaged 25000 educational materials produced
Development of an application for monitoring active fires and risks (fire weather index)	No application	2 years	Digital application developed and operational	Number of people using application (at least 30% of local people in FBiH)

