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Review Article

Fire Protection of Religious Buildings in Serbia: Challenges, Risks, and Improvement Measures

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ABSTRACT

Religious buildings in the Republic of Serbia, particularly Orthodox churches and monasteries, represent a significant component of the nation's spiritual, cultural, and historical heritage; however, they remain highly susceptible to fire hazards. This study evaluates the current state of fire protection in these structures, with particular attention to risks associated with architectural features, liturgical practices, age, cultural significance, and institutional protection frameworks. The analysis draws upon scientific and professional literature, relevant normative and institutional frameworks, and documented fire incidents in religious buildings. The results demonstrate that fire protection remains fragmented and insufficiently integrated, with technical measures frequently addressed in isolation from legal, organizational, cultural, and financial considerations. Key challenges include outdated electrical systems, the use of open flames during rituals, limited financial resources, inadequate technical documentation, and constraints imposed by cultural heritage protection. The study contends that effective fire protection for religious buildings necessitates a comprehensive, context-sensitive approach that incorporates preventive technical systems, risk assessment, legal compliance, institutional collaboration, and education for clergy and users. This research contributes to the field by emphasizing the need for a systematic, proactive fire risk management framework for religious buildings in Serbia to safeguard both human safety and cultural heritage.

KEYWORDS

Disasters; Orthodox churches; fires; fire protection; buildings; cultural heritage.

1. Introduction

Orthodox churches in the Republic of Serbia are not merely places of worship but also cultural monuments of exceptional significance. Numerous churches and monasteries, such as the Hilandar Monastery on Mount Athos or the Church of St. George in Ostrog, represent not only spiritual centers but also vital components of Serbian history and culture (Blagojević, 2002, p. 119). However,

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like all cultural assets, these structures are at risk of fire, which may cause irreversible damage (Cvetković, 2026; Cvetkovic, 2019; Cvetković et al., 2022; Cvetković et al., 2024; Molnár, 2024; Olawuni et al., 2021; Tout et al., 2024). After the Second World War, the newly established socialist authorities in Yugoslavia designated religiosity, and consequently Orthodox Christianity, as ideologically undesirable and socially problematic. Although representatives of the emerging political elite initially attended major religious events in the immediate post-war period to consolidate power temporarily, this phase was soon followed by the institutional marginalization of religion. Through the systematic adoption of laws and regulations, the state pursued the demonopolization, depoliticization, and economic weakening of religious communities, with the Serbian Orthodox Church being particularly affected. As a result of agrarian reform, tens of thousands of hectares of land were confiscated. At the same time, the process of nationalization led to the loss of more than one thousand buildings, including properties of historical and cultural value. In addition, in 1952, the Faculty of Orthodox Theology was removed from the University of Belgrade, and religious education was entirely excluded from the public education system.

This process was guided by the belief that the Church's economic strength was directly linked to its social influence and perceived political "reactionism," making the weakening of its financial base a central objective of state policy (Blagojević, 2002, p. 119). Such a historical legacy has had far-reaching consequences for the functioning and maintenance of church buildings, particularly regarding fire protection. In the absence of institutional support, ensuring basic safety conditions was largely left to church administrations, which lacked both the capacity and the financial resources for such investments. As a consequence of these policies, inadequate maintenance of church facilities persists to this day, heightening fire risk and often resulting in catastrophic consequences for sacred and cultural heritage.

This research seeks to bridge existing divisions in the analysis of fire risk assessment in churches and to develop a comprehensive and optimal fire risk management model. Particular emphasis is placed on respecting the liturgical and cultural-historical specificities of church buildings, as well as the legal and canonical limitations that affect the applicability of certain technical fire protection measures. Accordingly, the research is structured into several segments. First, an analysis of the sociocultural context of church buildings highlights the roles of clergy, worshippers, and church administrations within the fire protection system, as well as the presence of informal organizational structures within church communities that may influence safety culture. Second, normative and canonical frameworks are examined through an analysis of national and international regulations governing the protection of cultural heritage and religious buildings, with particular attention to restrictions on the implementation of certain technical solutions in structures designated as cultural assets or subject to ecclesiastical canons. Third, fire risk assessment and fire phenomenology in churches are addressed by examining the causes and types of fires in religious buildings based on previous incidents, while comparing existing protection models with identified weaknesses in organization, maintenance, supervision, and emergency response. Special emphasis is placed on examples of churches that have suffered extensive fire damage, such as Hilandar Monastery and Belgrade Cathedral Church, to identify critical shortcomings in the existing fire protection system and propose measures to improve it.

Although the protection of religious heritage from fire hazards is increasingly recognized as an important issue, existing research remains fragmented and largely confined to specific disciplines. Previous studies have primarily focused on technical fire protection systems, legal requirements, or individual case analyses, often without integrating the architectural, cultural, liturgical, organizational, and institutional characteristics that shape fire safety in religious buildings (Abashkin, Muslakova, Prisadkov, Ulichev, Fadeev, & Khodos, 2024; Arvidson, Egeltoft, & Godby, 2025; Castro, Gonçalves, & Perestrelo, 2023; Copping, 2002; Cucco, Di Ruocco, & La Rana, 2023; "Fire Suppression Systems in Historic Places of Worship," 2015; Furmanek, 2024; García-Castillo, Payá-Zaforteza, & Hospitaler, 2022; Kuznetsov, Kopylov, Sushkina, & Zhdanova, 2022; S.-H. Lee, 2021; Maluk, Woodrow, & Torero, 2017; Mandryk & Zhyrak, 2025; Olagunju & Udeze, 2025; Paszkowski & Balcerzak, 2023; Prisadkov, Muslakova, Ushakov, Abashkin, & Prisadkov, 2021; Salman, Rahmawati, Phuspa, Suhaimi, & Ramli, 2025; Tasionas, Giovannopoulos, Giovannopoulos, & Kalogirou, 2024; Torero, 2019; Vovk, Ferents, & Lyn, 2021; Zhong, Li, Liu, Zhang, & Wen, 2025). Also, existing research sug-

gests that disaster risk in religious and other functionally sensitive buildings should be understood through an integrated perspective that includes religious and community factors, institutional coordination, crowd dynamics, holistic risk governance, continuity planning, and context-specific risk assessment in facilities with cultural or organizational significance (Cvetković et al., 2023; Jurišić & Marceta, 2024; Parameswaran Kunjukrishnan & Krishnakumariamma, 2024; Cvetković et al., 2024; Kumar, 2024; Hanif et al., 2025).

Furthermore, the context of the Republic of Serbia has received limited scholarly attention, especially regarding Orthodox churches, which function simultaneously as sacred spaces, cultural heritage sites, and publicly accessible buildings, all of which are exposed to diverse fire risks. Consequently, there is a notable research gap in developing a comprehensive, context-sensitive framework for assessing and enhancing fire protection in religious buildings.

This paper analyzes the current state of fire protection in religious buildings in the Republic of Serbia, with particular emphasis on Orthodox churches, and identifies the key technical, legal, organizational, and institutional challenges affecting their protection. It also examines the primary sources of fire risk, evaluates the limitations of existing fire protection measures, and proposes directions for developing a more integrated and effective fire risk management approach. Through this analysis, the study contributes to a more systematic understanding of fire protection in religious buildings from the perspectives of public safety, cultural heritage preservation, and institutional responsibility.

2. Methodology

This review employs a qualitative, thematic methodology grounded in the analysis of scientific literature, professional publications, legal documents, institutional reports, and selected case studies relevant to fire protection in religious buildings. The source base comprises both domestic and international references addressing fire safety in churches and heritage buildings, disaster risk management, the legal protection of cultural property, and institutional aspects of risk governance. Materials were selected for their thematic relevance, with particular emphasis on sources concerning Orthodox religious buildings, cultural heritage protection, and fire risk factors in functionally sensitive structures. The collected material was subjected to thematic analysis to identify recurring patterns, major challenges, regulatory constraints, and potential improvement measures. The analysis was structured around four interrelated dimensions: the sociocultural characteristics of religious buildings, the causes of fires, the legal and institutional frameworks, and contemporary fire protection measures. This methodological approach establishes a foundation for a comprehensive and context-sensitive understanding of fire protection in religious buildings in Serbia.

3. Identification of Problems and Examples of Fires in Religious Buildings

The issue of fire protection in religious buildings can no longer be regarded solely as a technical matter; rather, it is primarily a systemic and political concern. In the absence of clearly defined mechanisms of support, funding, and institutional cooperation, places of worship remain exposed to significant risks, while their cultural and spiritual heritage is irreversibly endangered. It is therefore necessary to reassess priorities within cultural policy and to strengthen cooperation between the state and the Serbian Orthodox Church in all aspects of fire protection. Orthodox churches constitute structures of exceptional cultural, historical, and spiritual value, in which not only liturgical life takes place but also where valuable sacred objects, icons, and manuscripts are preserved. As such, these buildings require a special protection regime, including preventive fire safety measures. The Fire Protection Act, together with relevant bylaws and regulations governing the protection of cultural heritage, represents the fundamental normative framework regulating fire prevention and emergency response in religious buildings. Although Orthodox churches are often designated as immovable cultural heritage, it remains essential to implement contemporary safety measures in accordance with legal requirements, while respecting their liturgical and architectural specificities.

The characteristics of churches as spaces where large numbers of people gather, combined with the presence of old wooden structures, iconostases, and the use of candles and incense in religious rituals, significantly increase the risk of fire. These conditions necessitate carefully planned and tailored fire-protection measures that comply with canonical rules without compromising the authenticity of the sacred space.

Church communities frequently face challenges in organizing fire safety, including insufficient training of clergy and worshippers in emergency response procedures, as well as the absence of organized evacuation plans and early fire detection systems. Furthermore, financial constraints and aging construction often hinder the implementation of conventional active and passive fire protection systems, necessitating innovative, context-sensitive solutions. In addition to risks arising from liturgical practices and the use of open flames, technical hazards are also present, such as outdated electrical installations, malfunctioning heating appliances, improper storage of flammable materials, and the potential spread of fire from the surrounding environment (e.g., from nearby forested or urban areas within the vicinity of church complexes). The identification and assessment of fire risk sources in churches, along with the implementation of appropriate preventive and intervention measures—including smoke detectors, fire alarm systems, staff training, and evacuation planning—represent key elements of responsible fire risk management. This process must be grounded in a multidisciplinary approach that integrates technical, safety, cultural, and theological dimensions of protection. One of the most severe cases is undoubtedly the fire at the Hilandar Monastery, which occurred during the night of 3–4 March 2004 and represents one of the most devastating events in the history of Serbian spiritual and cultural heritage. This tragic incident destroyed more than half of the monastery complex, including old residential quarters, four chapels, administrative premises, and the library. The church and the most revered icons, including the miraculous icon of the Three-Handed Mother of God (Trojeručica), remained unharmed. The fire was caused by a defective chimney in the abbot's residence, which became hazardous due to ground subsidence and cracks in the walls. The fire rapidly spread through the roof structure and attic space, engulfing the northern part of the monastery complex. According to estimates, approximately 55% of the monastery's usable area—amounting to 5,897 m² of built structures—was destroyed.

4. Causes of Fires in Religious Buildings

A significant number of fires and explosions result from non-compliance with or violations of basic fire safety requirements, improper handling of equipment, failure to provide mandatory training for personnel, poor organization, and breaches of safety regulations (Cvetković, Protić, & Stefanović, 2023). Ensuring an adequate level of safety—both in technological processes and across buildings and institutions—cannot be achieved unless all necessary organizational and technical fire and explosion protection measures are carefully planned and implemented in advance. Fire and explosion risk management is particularly important for facilities with a high level of fire hazard, as it aims to prevent incident situations and mitigate their potentially harmful consequences (Cvetković & Filipović, 2020). The implementation of preventive fire and explosion protection measures also presupposes that personnel possess sufficient knowledge of fire and explosion risk management, including awareness of appropriate preventive and protective actions, procedures for extinguishing potential fires, and methods for reducing risk to the lowest possible level. Based on the causes of fire occurrence, the following sources may be identified: design and construction deficiencies, structural defects, damage and malfunctions, heating appliances and fireplaces, sparks, open flames, cigarette butts, welding, cutting and soldering operations, electrical appliances and equipment, electrical faults, friction, grinding, collisions, spontaneous ignition, exothermic reactions, explosions, atmospheric discharges, as well as other causes (Balch, Bradley, Abatzoglou, Nagy, Fusco, & Mahood, 2017; Clarke, Gibson, Cirulis, Bradstock, & Penman, 2019; Dorph, Marshall, Parkins, & Penman, 2022; Ganteaume, Camia, Jappiot, San-Miguel-Ayanz, Long-Fournel, & Lampin, 2013; Gillman & May, 2007; Keeley & Syphard, 2018; Ko, 2022; Kondashov, Bobrinev, & Udavtsova, 2024; Kumar & Balachander, 2023; H. Lee, Son, Je, Huh, & Lee, 2023).

According to the place of origin and the environment in which they occur, fires and explosions may be classified into those occurring within buildings, in means of transport, and in open spaces. What is common to all categories is that a fire can occur only if the basic conditions for combustion are met, namely the presence of combustible material, an oxidizing agent (oxygen), and an ignition source. If any one of these three elements is absent, a fire cannot occur (Novaković, 2018, p. 79). Fires in churches may arise from a variety of causes, among which the most frequent are faulty electrical installations, improper handling of candles, and external factors such as lightning strikes or deliberate arson (Kostić et al., 2020, p. 45). In addition, churches often contain flammable materials used in decorative and liturgical elements, which further increases the risk of fire outbreaks (Ilić, 2019, p. 112).

5. Legal and Institutional Framework

The legal protection of cultural property may be defined as a segment of the legal system encompassing norms and value-based principles aimed at preserving the material substance of a society's cultural identity and continuity. From the perspective of fire protection in religious buildings, this definition is particularly significant, given that many churches in Serbia have been designated as immovable cultural properties of exceptional importance. General norms governing the protection of such buildings fall under various branches of law—ranging from cultural law and cultural heritage protection (Milutinović, 2001, p. 222) to fire safety regulations and state–church law. In this context, state–church law, as a discipline that regulates relations between the state and religious communities, plays an important role in shaping the legal framework for the protection of religious buildings (Avramović, 2007, p. 12), including fire prevention and fire protection. Given that religious cultural heritage constitutes a significant portion of humanity's overall cultural heritage, there is a legitimate interest in examining its protection from multiple perspectives—not solely as an issue of cultural policy, but also as a matter of preserving collective identity and safeguarding the right to freedom of religion. Accordingly, fire protection of churches should not be viewed exclusively as a technical issue, but rather as an integral part of a broader system for preserving the spiritual and cultural continuity of a nation. It is therefore necessary to develop and enhance a normative framework that acknowledges the specific characteristics of religious buildings—their architecture, function, and symbolism—while simultaneously ensuring effective and context-sensitive measures for fire prevention, intervention, and post-fire recovery.

Fire protection of churches in the Republic of Serbia is regulated by a range of legal and institutional arrangements that are predominantly fragmented. The Law on Cultural Property prescribes measures for the protection and preservation of cultural heritage, while the Fire Protection Act regulates fire safety. In this context, key institutional actors include the Ministry of Internal Affairs, the Republic Institute for the Protection of Cultural Monuments, and local fire and rescue services. Education and training of clergy and local safety services also play an important role. Clergy members regularly receive training in the safe handling of candles and electrical installations, as well as instruction on emergency response procedures in the event of a fire (Jovanović et al., 2018, p. 43). One of the most significant challenges in church fire protection is the lack of financial resources, particularly in rural areas where the burden of building maintenance is more pronounced. Consequently, it is necessary to direct funding toward local communities engaged in addressing these issues and to establish mechanisms for cooperation among state institutions, church authorities, and non-governmental organizations (Kostić et al., 2020, p. 45). The digitalization of fire safety and the application of advanced technologies, such as "smart" monitoring systems and early fire detection technologies, represent an important step toward enhancing the safety of these buildings (Ilić, 2019, p. 112). Regular fire risk assessments and the implementation of systems for continuous maintenance and restoration of church buildings are also recommended.

Documentation essential for fire risk assessment includes the following (Mlađan, 2009, p. 56):

– A decision issued by the Ministry of Internal Affairs of the Republic of Serbia classifying the building according to its level of fire risk;
– Insurance policy documentation;

– Main design documentation, including architectural and construction designs, water supply and sewage projects, electrical power installations and distribution systems, protective systems, mechanical and technological designs, and related documentation;
– Reports of the technical inspection commission and occupancy permits;
– Investment and technical documentation related to any extensions or reconstructions (if applicable), including as-built project documentation;
– Normative acts in the field of fire protection;
– Regulations, orders, and official notices related to fire protection;
– Documentation on previous fire incidents (if any);
– Instructions for the maintenance and use of fire protection equipment, devices, and systems;
– Lists and quantities of flammable materials, as well as internal regulations governing the use and storage of flammable substances;
– Records of inspections of electrical and gas installations;
– Records of inspections of portable electrical devices and tools;
– Information on persons with disabilities present in the building;
– Records of fire safety training provided to building users;
– Documentation confirming familiarity with evacuation plans and records of evacuation drills;
– Records of inspections and periodic reviews of implemented technical fire protection measures, including portable and mobile fire extinguishers, automatic fire detection and alarm systems, explosive gas and vapor detection systems, smoke extraction and dust removal systems, fixed fire suppression systems, emergency lighting, pressure vessels and installations, and electrical power installations, distribution systems, and wiring;
– Standard operating procedures for work involving open flames, spark-producing tools, and any fire-related risk assessments associated with such activities, where applicable.

6. Contemporary Fire Protection Measures

In recent years, Orthodox churches have increasingly been equipped with contemporary fire protection systems. These include early fire detection through sensors and alarm systems, as well as automatic fire suppression systems, such as spray-based and carbon dioxide (CO_2) systems (Serbian Orthodox Church, 2023, p. 89). In many cases, outdated electrical installations—recognized as potential fire hazards—are also being replaced. Technical fire protection measures in religious buildings include the following (Radovanović et al., 2021, p. 125):

- Early fire detection systems: Early fire detection systems in church buildings should include smoke and heat detectors installed in attics, near candle stands, and in altar areas. Automatic alarm systems connected to local fire brigades or mobile monitoring applications are also recommended. In addition, it is important to use presence and fire sensors that are resistant to dust and humidity, making them suitable for older buildings with specific microclimatic conditions.
- Fire alarm and notification systems: Fire alarm and notification systems should provide both visual and audible signaling upon activation. Where architectural conditions allow, emergency or panic lighting and clearly marked evacuation routes should be installed. Evacuation instructions and fire escape signage should also be clearly displayed to facilitate safe and timely evacuation.
- Fire suppression systems: Fire suppression systems should include portable fire extinguishers, preferably CO_2 or dry powder extinguishers, due to the sensitivity of icons and frescoes. Automatic fire suppression systems are also highly important, particularly aerosol-based systems that operate without water and do not damage works of art, as well as dry pre-action sprinkler systems, which are activated only in the event of a confirmed fire and are not triggered by false alarms. In larger buildings, such as cathedral churches and monastic complexes, manual fire hydrant systems should also be provided.

- Electrical installations: Particular attention should be given to electrical installations, especially in buildings older than 50 years. This includes replacing deteriorated electrical systems, installing automatic circuit breakers and surge protection devices, and using non-combustible materials for cables and junction boxes. It is also necessary to ensure a dedicated power supply and adequate protection for candlelighting systems.
- Lightning protection and grounding: Modern lightning protection systems with active air terminals should be installed in church buildings. Regular inspection of grounding systems and conductor resistance is equally important to ensure the reliability and effectiveness of the entire system.
- Video surveillance and remote monitoring: Video surveillance and remote monitoring systems should include surveillance cameras with night vision and smoke or motion detection capabilities. Remote monitoring through video links accessible on the mobile devices of authorized personnel can significantly enhance rapid response. Video recordings should be stored either on cloud-based platforms or on local servers for later review and documentation.
- Architectural and passive protection measures: Architectural and passive protection measures should include the installation of fire-resistant doors and non-combustible materials in storage areas. Flammable materials should be removed from attic and basement spaces, while fire-resistant curtains or protective screens should be installed around candle stands. Regular maintenance of all fire protection systems is of crucial importance for ensuring their long-term functionality and effectiveness.

The following section provides an overview of statutory obligations in fire protection for church buildings.

7. Conclusion

Fire protection of religious buildings in the Republic of Serbia must be addressed through a systemic and integrated approach. A combination of technical, legal, and educational measures is essential to ensure that these sacred sites are preserved and protected for future generations. Accordingly, continued investment in modern fire protection equipment, as well as in providing ongoing training for all relevant stakeholders, remains of paramount importance. Although churches in the Republic of Serbia are not only places of worship but also cultural monuments of exceptional significance, the state's approach to their fire protection remains largely formal, declarative, and reactive. Instead of a comprehensive and proactive strategy, fire protection in religious buildings often depends almost exclusively on the limited capacities of religious communities, donations, or delayed intervention after damage has already occurred. A considerable number of churches, particularly in rural areas and smaller dioceses, lack even basic fire-protection equipment. Moreover, no dedicated state fund exists for this purpose, even though budgetary resources and funds allocated for cultural heritage and environmental protection should, by their very nature, also encompass sacred buildings.

Current investments are typically limited to isolated projects, most often implemented only after incidents that receive significant media attention. Although the Fire Protection Act formally obliges all legal entities to implement prescribed fire safety measures, in practice, there is no effective mechanism to ensure their systematic application in religious buildings. The majority of churches lack comprehensive technical documentation, fire protection designs, or registered alarm and evacuation systems. Older churches, which are legally protected as cultural heritage sites, pose a particularly serious challenge. Rather than being granted priority within protection systems, such buildings are frequently excluded from public policies precisely because of their "sensitivity," which in practice results in a lack of institutional responsibility for their safety. Paradoxically, while the state formally recognizes these churches as cultural assets, it simultaneously fails to provide adequate support for their basic preservation and safety measures. Instead of assuming an active role in the planning, financing, and supervision of fire protection measures, responsibility is transferred almost entirely to church administrations. Such an approach disregards the reality that most churches lack stable funding, trained personnel, and the technical conditions necessary to implement legally prescribed

measures. In addition, applications for public funding often involve complex bureaucratic procedures that church communities cannot meet.

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