

Policy Brief One: Curbing Wildfires

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Executive Summary

This policy brief talks about the increasing risk of wildfires, caused by climate change and how they affect the environment and people's health. First, we proposed three options, using new preventive technologies like AI and sensors to detect fires early, supporting research to improve firefighting methods, and creating awareness for communities about how to prevent wildfires through volunteering and awareness activities. These actions' goal is to decrease the damage from wildfires, protect nature, and make communities safer. However, we agree at the end to proceed with the first option.

Introduction and Defining the Problem

Wildfires are among the most significant natural hazards worldwide (Jiang et al., 2025). Over the past two decades, the occurrence of catastrophic wildfires worldwide has more than doubled. Climate change is a key factor in the increasing frequency and intensity of wildfires, driven by hotter, drier conditions and prolonged droughts (Balmes et al., 2025). Wang et al (2024) stated that wildfires are a major environmental challenge with widespread effects on the atmosphere, land, and water resources. Their impact extends beyond the areas where they occur, influencing the climate system in complex ways. Understanding these environmental effects and their interactions with climate requires advanced research using detailed observations and Earth System Models. Such studies are essential for developing effective strategies to address this global issue.

This policy brief talks about the growing threat of wildfires due to climate change and how they harm the environment and people's health. It suggests three main solutions: using advanced technologies like AI and sensors to detect fires early, supporting research to improve

ways to fight fires, and teaching people about wildfire prevention through education and community activities. These actions will help reduce damage from wildfires, protect nature, and keep communities safer.

Why is the topic important, why should people care?

Wildfires hurt the environment, such as;

Vegetation (Habitat loss, altered and introduction of invasive species, direct mortality)

Soil (changes the soil structure and erosion, alterations of soil nutrients and chemistry, changes microorganism communities)

Water (Increased runoff and sedimentation, alterations to water quality)

Air quality (increase of greenhouse gas emissions, particulate matter and air pollution)

Wildlife (direct mortality and habitat loss, changes in food availability)

What are the goals and overall findings

To reduce environmental degradation as a result of wildfires. The impacts of wildfires can impact the very ecosystems that support human life.

Goal:

The goal is to improve prevention, early detection, and community participation in order to reduce the damage caused by wildfires to lives, properties, and the environment.

Findings:

Advanced Fire Detection (Option 1): Using technology like AI, drones, and sensors helps detect wildfires early and respond faster, protecting people and the environment.

Research and Development (Option 2): More research helps understand wildfire effects and creates better methods to control and prevent them.

Community Education and Volunteering (Option 3): Teaching people through workshops, organizing clean-up activities, and using online tools helps increase awareness and involves people in wildfire prevention.

Approaches and Policy Options

Option 1

Investing in advanced fire detection (utilizing surveillance such as satellite imagery and ground sensors for early fire detection).

Okoro et al. (2024) stated that advanced technologies, including AI-powered remote sensing and 5G-based active monitoring, can improve early wildfire detection and management.

Additionally, highly intelligent drones and IoT devices can enhance safety and efficiency in wildfire response efforts. Additionally, the integration of these technologies marks a significant advancement in disaster response, enabling authorities to take proactive measures against wildfires and better protect lives, property, and the environment from their destructive impact.

Option 2

Investing in research and development for fire suppression and prevention techniques Gunnarsdottir et al.(2025) stated that Improving infrastructure involves replacing wooden structures with fire-resistant building materials and creating a buffer zone around the area.

Installing water faucets and fire claps at critical locations enhances firefighting capabilities.

Clearing vegetation around infrastructure and replacing soil with gravel can help reduce fire risks. Additionally, building access roads for firefighting, which can also serve as escape routes, is essential. Investing in suitable equipment and spare parts, such as electrical equipment, strengthens preparedness efforts.

Option 3

Creating community awareness and volunteering for wildfire prevention, following the Canadian Wildland Fire Prevention and Mitigation Strategy (2024). Increasing awareness and community involvement can help reduce wildfire risks. Creating awareness and training communities and encouraging them to take action can make a big difference.

Workshops and Presentations in Schools and Universities: Organize regular workshops and talks at universities, colleges, and schools to teach students about wildfire risks and safety measures. Prepare a plan of events to conduct presentations and workshops at all educational institutions.

Community Clean-Up and Volunteering: Organize volunteer events where people help clean dry leaves, dead plants, and other flammable materials from parks, forests, and neighborhoods. Encourage local communities to make sure that their homes and public areas follow fire safety rules.

Promoting and Utilizing Online Tools for Awareness: Promoting and utilizing the online platform with fire safety tips, and distributing the existing risk maps and emergency contacts (Ministry of Natural Resources, n.d.). Promoting and utilizing social media and mobile apps to share wildfire prevention advice and real-time updates. For example, Ontario Forest Fires has three accounts Facebook (n.d.), Instagram (n.d.), and X (n.d.). Promoting and encouraging individuals to report risky areas, such as places with too much dry vegetation, through the Forest Fires website (Ontario, n.d.).

Conclusion

When wildfire goes undetected in its early phase, it becomes out of control. Once this occurs, not only does the fire damage but the black powdery residue known as soot is left behind. This soot can be dangerous to both humans and animals.

- Soot can negatively impact vegetation by physically blocking the sun, chemically affecting plant tissues, and contributing to soil contamination.
- Soot can significantly impact water quality by contaminating it with fine particles, decreasing the amount of sunlight that is penetrated, and increasing its acidity which can lead to the detriment of aquatic life.
- Soot impacts air quality by introducing fine particles. If those particles enter the lungs, it can cause serious health issues such as heart and lung disease and even death in all species.

Investing in option 1 advanced fire detection such as satellite imagery and ground sensors will allow the necessary personnel to detect the wildfire at a faster pace and isolate the wildfire to limit its effects.

Implications and Recommendations

Investing in advanced fire detection (utilizing surveillance such as satellite imagery and ground sensors for early fire detection).

Implementing this policy option will serve as a proactive measure in the protection of lives, property, and the environment. The technologies implemented will include Advanced Intelligence powered remote sensing and drones. This will improve wildfire detection and management, along with enhancing safety and efficiency in wildfire response efforts.

By turning the environment into an intelligent system, advanced technology makes proactive wildfire detection and prevention possible. An intelligent environment is capable of

self-awareness, self-defense, and self-monitoring. These skills allow the environment to respond quickly to changes and quickly notify the reaction team, preventing significant casualties (Okoro et al., 2024).

- Get funding and support from schools, businesses, and local organizations.
- Work with government agencies to add fire prevention programs to community activities.
- Check progress regularly and make improvements based on feedback from participants.
- More people will understand how to prevent wildfires and respond safely.
- Communities will be actively involved in keeping their areas safe.
- Stronger teamwork between schools, local leaders, and organizations to reduce fire risks.
- By educating people and involving them in fire prevention, we can make Canada more prepared for wildfires and keep communities safe.

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