

The Vicious Cycle:

Wildfires and Climate Change

Wildfires and climate change are intricately linked, with various climatic factors exacerbating the risk and severity of wildfires. **Climate change causes a cascade of events that contribute to the increased number and rapid spread of wildfires.** Rising temperatures, prolonged droughts and erratic precipitation patterns create favourable conditions for the ignition and propagation of wildfires. Additionally, storms with lightning strikes, intensified by rising temperatures, become more frequent, further elevating the risk.

Linking Climate Change and Wildfires

One significant consequence of climate change on forests is drying vegetation, making them more susceptible to ignition and rapid spread of fires. Higher temperatures and extended drought periods contribute to this drying process, creating an arid landscape primed for combustion.

The lengthening of fire seasons and intensifying droughts associated with climate warming disrupt natural fire extinction processes. Prolonged fire seasons delay the onset of fall and the return of moist conditions, impeding the natural cessation of fires. Consequently, fires may transition into a smouldering phase, persisting through the winter months and fueling the dissemination of large overwintering fires.

These phenomena demonstrate the complexity between climate change and wildfires, highlighting the urgent need for mitigation and adaptation strategies to address the escalating risk of wildfires in a changing climate.

Vapour pressure deficit (VPD)

Vapour pressure deficit (VPD) is a critical indicator of forest aridity, capturing the collective impact of climate change on moisture levels in the atmosphere and vegetation. Elevated VPD levels result in accelerated water loss from plants, leading to desiccation and increased flammability of vegetation over prolonged periods.



Greenhouse gasses (CO₂, PM)

Increasing carbon emissions leads to a historical global mean temperature rise.

Increased Temperature

We have been observing increasing global temperatures during recent decades, resulting in an exponential climb in VPD.

High VPD

High VPD affects plant physiology regardless of other factors associated with climate change and leads to increased evaporation and vegetation drying.

Drought and Dry Vegetation (Fuel)

If we have more dry vegetation and drought, ecosystems can more easily ignite and spread fire, leading to larger, higher-severity wildfires.

Wildfire

The wildfires in Canada in 2023 released the highest carbon emissions on record, leading to significant and rapid releases of greenhouse gases.

How can we break the cycle?

Cyclical Process of Wildfires



What you can do!

Wildfires are a complex natural hazard that depends on the dynamic interplay between climate, fuels that the fire burns, ignition sources and topography. Scaling and increasing intensity of wildfires underscore the necessity of taking measures for adaptation and mitigation. So what can we do?

We should concentrate on measures for adaptation and mitigation. For the [United Nations Office for Disaster Risk Reduction](#) (UNISDR), mitigation can be understood as “the lessening or limitation of the adverse impacts of hazards and related disasters.” At the same time, adaptation is “the adjustment in natural or human systems in response to actual or expected stimuli or their effects, which moderates harm or exploits beneficial opportunities.”

Climate change has significantly increased the number of severe wildfires. As global warming continues to increase, wildfire frequency and severity are set to rise, requiring a [fundamental shift](#) in wildfire management.

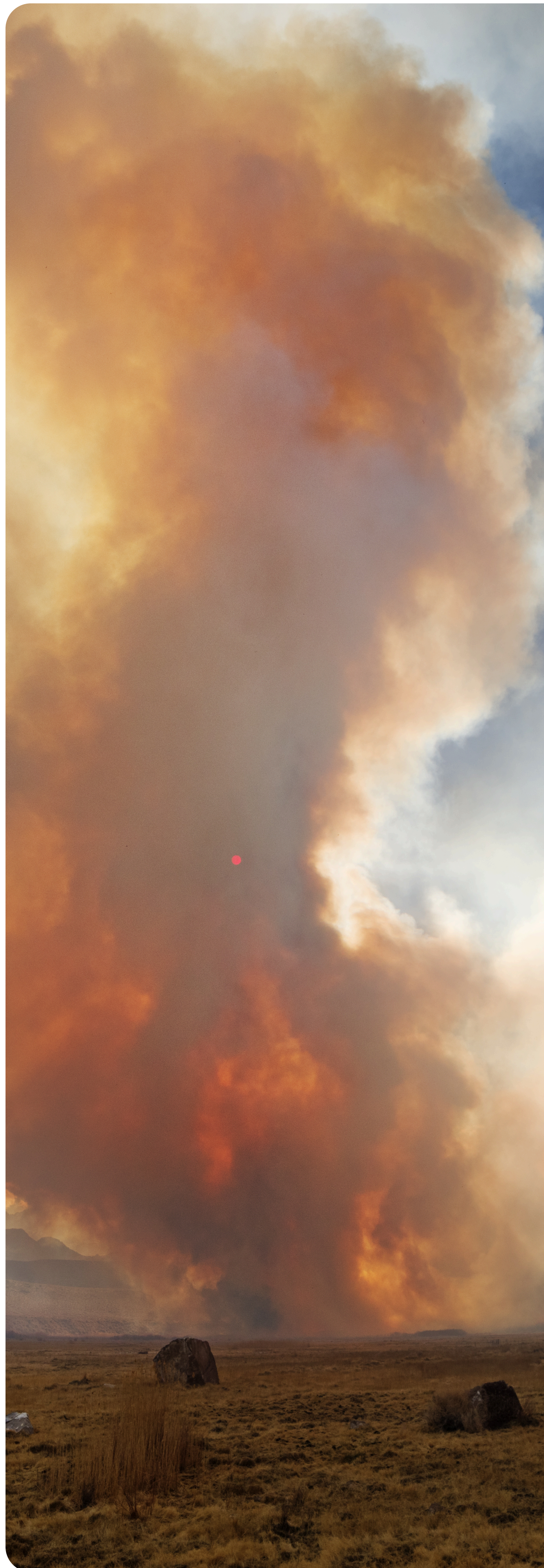
Measures

Adaptation

- Wildfire risk assessment
- Adaptive ecosystem management
- Ecosystem protection and restoration
- Material investments in firefighting
- Emergency Preparedness
- Infrastructure network resilience
- Fire monitoring systems

Mitigation

- Wildfire Awareness
- Fuel breaks and buffer zones
- Cross-border cooperation mechanisms
- Land-use planning
- Building codes and standards
- Reduce fossil fuel consumption
- Promoting renewable energy
- More fire bans





Adaption Measure	Description
<i>Wildfire Risk Assessment</i>	Wildfire risk assessments identify and estimate current and future wildfire threats by evaluating potential hazards. To understand how climate change will affect future wildfire risk, projections, and downscaled projections, should be conducted to guide decision-making in wildfire adaptation.
<i>Adaptive ecosystem management</i>	Planting fire-resilient species and excluding particularly fire-prone species in high-risk areas is critical in reducing landscape flammability and increasing vegetation resilience to wildfires. These interventions are essential in fire-prone areas where highly flammable non-native species prevail. Governments should also incentivize more active forms of forest management, such as tree thinning, deadwood removal and reintroducing cultural burning practices.
<i>Ecosystem protection and restoration</i>	Healthy ecosystems are more resilient and less prone to negative wildfire impacts. Protecting and restoring degraded forests and peatlands are the main elements of wildfire risk prevention efforts. Forest restoration efforts such as reforestation, tree diversity restoration and controlling invasive and underbrush species are also central to wildfire risk prevention.
<i>Material investments in firefighting</i>	Fire incidence has increased year after year, resulting in the need to upgrade the means of fighting wildfires and protecting against them.
<i>Emergency Preparedness</i>	In response to the growing occurrence of extreme wildfires, we need to adapt and improve wildfire management practices. An overwhelming focus must be directed towards strengthening emergency preparedness and response capacities. Adaptation also includes creating and improving local firefighting capacity, escape strategies, evacuation routes and shelters.
<i>Infrastructure network resilience</i>	Critical infrastructure networks must be designed and updated to be resilient to wildfires so they can continue operating during wildfire events. There are times when wildfires are caused by damaged infrastructure.
<i>Fire monitoring systems</i>	Space and airborne monitoring are good options for observing the edges of burn scars from the preceding year and new wildfires. Fire suppression is most successful and cost-effective when applied early and on small fires. Fire management budgets are under increasing pressure because the risks and the costs associated with responding to fires are growing. Early detection and attack on wildfires may contribute to savings.

Mitigation Measure	Description
<i>Wildfire Awareness</i>	<p>Wildfire awareness is crucial because it provides insights into the threats that wildfires pose to our communities, the environment, the economy, health and overall safety. Raising awareness will help better understand the causes and origins of wildfires and their connections with human health and the economy.</p> <p>There are various approaches to raising wildfire awareness: education programs, public service announcements, social media, community involvement and others. Wildfire Community Preparedness Day is observed on the first Saturday in May in Canada.</p>
<i>Fuel breaks and buffer zones</i>	<p>Important fire risk prevention measures include buffer zones (or defensible spaces, i.e. strips of non-flammable land typically used to isolate exposed property, settlements, and key infrastructure assets from flammable vegetated land) and fuel breaks (i.e. non-flammable strips of land like roads, rivers, crops, etc.) that can slow down or limit wildfire spread by breaking fuel continuity.</p>
<i>Cross-border cooperation mechanisms</i>	<p>Countries need enhanced cross-border cooperation mechanisms to support each other during emergency periods. This will allow countries to more effectively address and manage regional and global wildfires.</p>
<i>Land-use planning</i>	<p>Land use planning can make homes and communities more resilient to wildfires and reduce risks in areas with high wildfire hazards. Zoning is a good example of a land use planning tool. An individual district's zoning determines what kind of land use is permitted and the intensity of development. We must continue to take steps to curb illegal and unsustainable land use.</p>
<i>Building codes and standards</i>	<p>Building codes and standards should regulate how physical assets such as houses and infrastructure are built or managed. Special wildfire building codes and standards must be followed by new homeowners, builders and infrastructure owners in hazard areas, as well as those who already own buildings and infrastructure in these areas.</p> <p>They require the use of non-flammable materials for buildings and fences or the upgrade and maintenance of assets using hard reinforcement and defensive measures (e.g. requirements on the fireproofing of windows, vents, chimneys, etc.).</p>
<i>Reduce fossil fuel consumption</i>	<p>Since wildfire risks continue to increase, Canada's primary goal is reducing fossil fuel consumption. To reduce wildfires, the government must cap oil and gas emissions.</p> <p>Also, different acts aimed at mitigating climate change and preventing global warming can minimize lightning strikes and, as a result, the number of wildfires.</p>
<i>Promoting renewable energy</i>	<p>Cleaner electricity can help make us safer, more secure, and healthier. We can use it to help make electricity affordable for everyone, reliable when needed, and cleaner for our health and planet.</p>
<i>More fire bans and strengthened responsibility</i>	<p>Fire bans and forest closures will be necessary in a world with ever-increasing fire risks and consequences to reduce the number of fires caused by humans during prolonged periods of unusually high fire danger.</p>
<i>Controlled burns/Prescribed fires</i>	<p>Prescribed fires can manage organic wildfire fuels, like decomposing roots or tree needles. Prescribed fires consist of small-scale, low-intensity, controlled fires ignited to achieve specific land management objectives, including extensive wildfire prevention and ecological or agricultural management.</p>